THE LANCET

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1288

PHM/SR9-54 (RB-5)

Alma-Ata 30 years on: "Health for all need not be a dream buried in the past."

See Editorial page 863

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Editorial

863 A renaissance in primary health care
864 IVF—one or two embryos?
864 A developing drug problem

Comment

865 Return to Alma-Ata
M Chan

866 From Alma-Ata to Agincourt: primary health care in AIDS
H Coovadia, R Bland

868 Perinatal depression treated by community health workers
V Patel, B Kirkwood

870 Task shifting in health care in resource-poor countries
B McPake, K Mensah

871 Integration of personal and community health care
C van Weel and others

873 Technology in global health: the need for essential diagnostics
E R Houpt, R L Guerrant

874 Child mortality 30 years after the Alma-Ata Declaration
E Loaiza and others

World Report

877 Cracks appear in Brazil's primary health-care programme
M Kepp

878 Can public-private partnerships improve health in India?
B Ghanashyam

880 Extension workers drive Ethiopia's primary health care
W Wakabi

Perspectives

881 Health in a just society
M Marmot

882 In brief
T Burki

883 Mirai Chatterjee: securing work and health care for women in India
S Boseley

884 Melancholy, medicine, and the arts
E Sullivan

Obituary

886 Julius Richmond
A Snyder

Correspondence

887 Primary health care must go beyond WHO
M Jimba and others

887 Iodine nutritional status in Tibet
R Moreno-Reyes, M Boelaert; C J Eastman and others

888 Iodine deficiency in the UK and Ireland
J H Lazarus, P P A Smyth

888 Voclosporin (ISA247) for plaque psoriasis
P Naidoo, V Rambiritch; K A Papp and others

889 35 years of Japanese policy on rare diseases
S Hayashi, T Umeda

890 Rare diseases: a role for primary care
T Senior, A Knight

890 The new Access to Medicine Index
T Reed; M K Ali, K M V Narayan

891 Registries and RCTs for new interventional procedures
R M Greenhalgh, J T Powell

892 GOLD MARK: an anion gap mnemonic for the 21st century
A N Mehta and others

Articles

893 Implications of mortality transition for primary health care in rural South Africa: a population-based surveillance study
S M Tollman and others

902 Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster-randomised controlled trial
A Rahman and others

910 How much does quality of child care vary between health workers with differing durations of training? An observational multicountry study
L Huicho and others

Series

917 Alma-Ata: Rebirth and Revision 1
Alma-Ata 30 years on: revolutionary, relevant, and time to revitalise
J E Lawn and others

928 Alma-Ata: Rebirth and Revision 2
Supporting the delivery of cost-effective interventions in primary health-care systems in low-income and middle-income countries: an overview of systematic reviews
S Lewin and others

940 Alma-Ata: Rebirth and Revision 3
Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care
R Beaglehole and others

950 Alma-Ata: Rebirth and Revision 4
30 years after Alma-Ata: has primary health care worked in countries?
J Rohde and others

962 Alma-Ata: Rebirth and Revision 5
Community participation: lessons for maternal, newborn, and child health
M Rosato and others

972 Alma-Ata: Rebirth and Revision 6
Interventions to address maternal, newborn, and child survival: what difference can integrated primary health care strategies make?
Z A Bhutta and others

990 Alma-Ata: Rebirth and Revision 7
Integrating health interventions for women, newborn babies, and children: a framework for action
B Ekman and others

1001 Alma-Ata: Rebirth and Revision 8
Primary health care: making Alma-Ata a reality
J Walley and others

Case Report

1008 Stranded in San Francisco
N Dey and others

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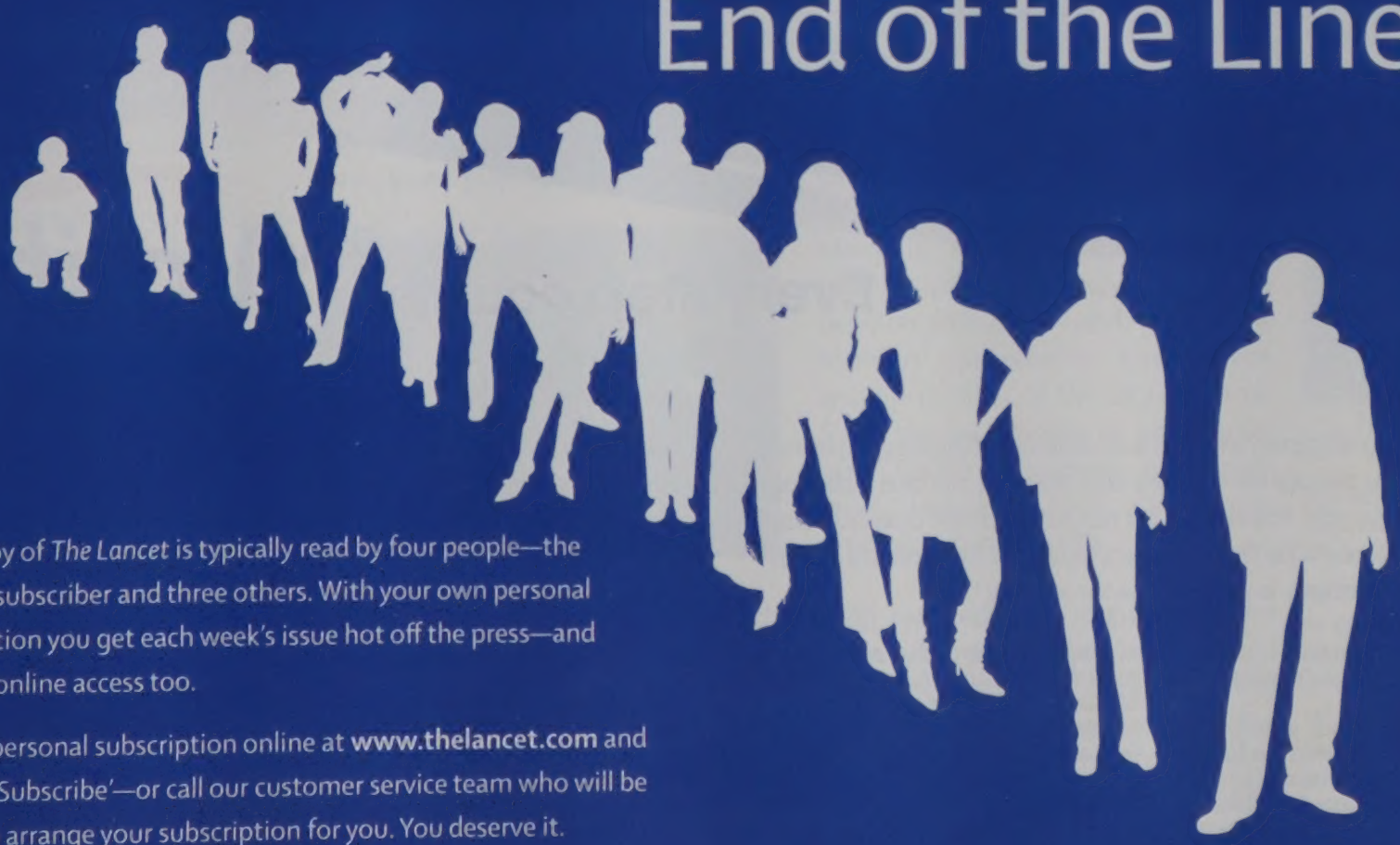

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Reuters

Floods hit Bihar 5 million people have become homeless as floods hit the deprived Indian state of Bihar. This figure includes 3 million children, who are some of the poorest and most vulnerable in India. With over half of children in Bihar already classified as underweight, the effect of the disaster is—and will continue to be—devastating.

Chemical reaction The US National Toxicology Program reports that human exposure to bisphenol A—a chemical used in many polycarbonate plastics and epoxy resins—could adversely affect the development of the prostate gland and brain in fetuses, infants, and children. The conclusions are based mainly on animal studies; however, the group could not dismiss the possibility that similar effects might occur in people.

Adoption crisis Intercountry adoption in Nepal has resulted in the abuse and exploitation of children, a study by UNICEF and charity Terre des Hommes has revealed. Some children are not orphaned but have been abducted and subjected to sale and trafficking. The report urges Nepal to tighten domestic legislation before intercountry adoption procedures continue.

Cancer control Rising morbidity and mortality from cancer has prompted the International Union against Cancer to update the targets of its World Cancer Declaration. Preventive policies such as reduced tobacco use and vaccination against cancer-causing viruses are included in the 11 targets for 2020, in addition to promoting training in oncology and reducing migration of trained oncology health workers.

Drug licensing The South African Government intends to replace the Medicines Control Council, which approves new medicines entering the market, with the Health Products Regulatory Authority. The move has caused consternation in some quarters because the new authority will allow appeals against approvals based on non-scientific grounds, potentially introducing delays into the approval of new products, say critics.

Listeria outbreak The Canadian Government is investigating a listeria outbreak linked to products from Maple Leaf Foods. 38 confirmed cases and 24 suspected cases have been reported. Of the confirmed cases, 13 deaths have been attributable to the bacteria, and six deaths are still being investigated. More than 200 products have been recalled and health officials have issued public warnings.

Reuters

Aid restrictions Despite the much welcomed lift of the ban on aid agencies' activities in Zimbabwe, the Government has now imposed strict conditions, which aid agencies say will be dangerously restrictive. The National Association of Non-Governmental Organisations said that by setting such stringent rules, the Government has effectively put a contentious bill into operation.

Stairway to health Taking the stairs regularly is a simple and practical means to improving health according to results presented at the European Society of Cardiology Congress 2008. Swiss researchers showed that for 69 sedentary participants who exclusively used the stairs at work for 12 weeks, aerobic capacity was improved by 8·6%, which confers to a 15% reduction in all-cause mortality risk. Beneficial effects were also seen on blood pressure, cholesterol, weight, fat mass, and waist circumference.

Recruiting health workers WHO has invited all persons and organisations concerned with the international recruitment of health personnel to submit their views on a draft code of practice, through web-based public hearings, until Sept 30, 2008. Shortages of health workers in recent decades, caused by their increased migration, has led to further weakening of already fragile health systems, which must be addressed if the Millennium Development Goals are to be achieved.

Abortion triumph In a vote of 8–3, Mexico's Supreme Court has reaffirmed Mexico City's abortion law, which allows terminations in the first trimester for any reason, a precedent of leniency for the region. Many in Mexico, a predominantly Catholic country, strongly object to the decision, including church groups, the Mexican Conservative Government, and up to 85% of the city's doctors. Since the law passed in April, 2007, over 12 000 procedures have been done, including 2000 for citizens residing outside the city.

Help wanted: cook/copy-editor An apple cake recipe in the Swedish food magazine *Matmagasinet* caused illness in four people, forcing a recall of the magazine. "Two pinches" of nutmeg became 20 whole nutmegs in print. Nutmeg contains the hallucinogenic compound myristicin and is toxic in large doses, causing convulsions, palpitations, nausea, dehydration, and body pain. A true recipe for disaster.

Panos Pictures

For more on the **World Cancer Declaration** see http://www.uicc.org/wcd/wcd2008.pdf

For the **US National Toxicology Program report on bisphenol A** see http://cerhr.niehs.nih.gov/chemicals/bisphenol/bisphenol.pdf

For the **UNICEF and Terre des Hommes study *Adopting the rights of the child*** see http://www.unicef.de/fileadmin/content_media/presse/0808-Studie-Nepal-Adoptionen/ADOPTING-the-Rights-of-the-Child_UNICEF_Terre%20des%20hommes_08.pdf

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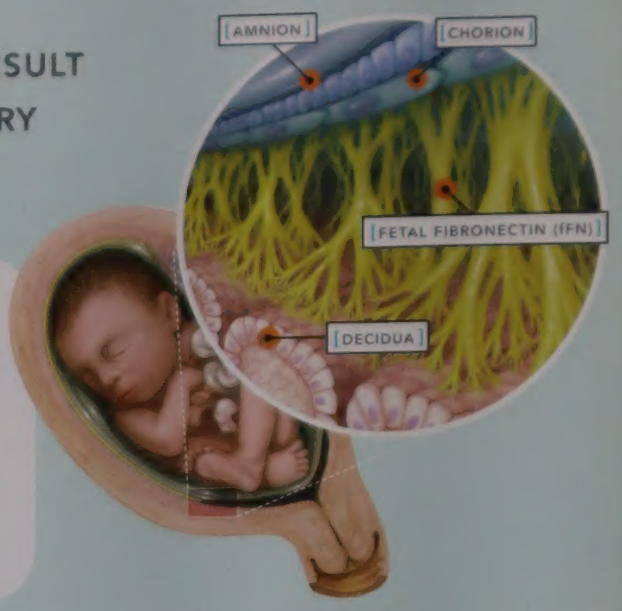

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1. Goldenberg RL, Iams JD, Mercer BM et al. The Preterm Prediction Study: The value of new vs standard risk factors in predicti early and all spontaneous preterm births. Am J Public Health. 1998;88:233-238 2. Peaceman AM, Andrews WW, Thorp JM et a Fetal fibronectin as a predictor of preterm birth in patients with symptoms: a multicenter trial. Am J Obstet Gynecol 1997; 177(1) 13-18. 3. Gallinat A. An impedance-controlled system for endometrial ablation: five-year follow-up of 107 patients. J Reprod Me 2007; 52(6): 467-72 4. Millennium Report Research Group, European Markets for Gynaecological Devices 2008, Dec 2007

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A renaissance in primary health care

30 years ago, in the midst of the Cold War, health experts and policy makers from 134 WHO member states convened in the former USSR to attend a conference on international primary health care. On Sept 12, 1978, the Alma-Ata Declaration was signed, with the ambitious target of achieving "Health for All by 2000".

In 1978, 2000 million people were estimated to have no access to adequate health care. There were vast inequalities between rich and poor countries, and between rich and poor populations within countries. The Alma-Ata Declaration revolutionised the world's interpretation of health. Its message was that inadequate and unequal health care was unacceptable: economically, socially, and politically. Unfortunately, the goal of "health for all", while a rallying call to action, was not met. Theories for this failure abound: the vision for primary health care was politically unacceptable to some nations and so was marginalised; emerging health threats took precedence (no one imagined the global disease burden that HIV/AIDS would bring); and health priorities shifted (to the Millennium Development Goals [MDGs]).

30 years on, what is the relevance of the Alma-Ata Declaration in 2008? In short, primary health care is now offering global health a lifeline. Progress towards the MDGs has stalled. Weak health systems have restricted the success of efforts to improve maternal, newborn, and child health, and to reduce the disease burden from malaria and tuberculosis. New epidemics of chronic disease threaten to reverse what small gains have been achieved. To get back on track, and to meet the MDGs by 2015, countries need to strengthen their health systems through the implementation of effective primary health care.

Now is the right moment to proclaim the urgent need for a renaissance in primary health care. The continuing relevance of this 30-year-old Declaration is remarkable. Many of the challenges faced in 1978 remain, such as infectious diseases (eg, the ongoing threat of H5N1 avian influenza and HIV/AIDS), political instability and conflict (most recently seen in Iraq and Zimbabwe), and worsening poverty (the World Bank last month estimated that 1·4 billion people now live in poverty).

In recognition of this timely reawakening of interest in primary health care, this week's *Lancet* revisits, updates, and relaunches the key messages from Alma-Ata. A series of eight papers begins with an analysis of modern primary health care, and issues such as implementing cost-effective interventions in low-resource settings and tackling the growing burden of chronic diseases. We publish an analysis of individual country progress since 1978, with possible lessons for those who have shown the least advance. Involvement of communities in planning and implementation of health care (one of the main tenets of the Alma-Ata Declaration) is explored in the context of maternal, newborn, and child health, as are the roles of national policies and effective service integration, all foundations of a successful primary health care service. The final paper in the series looks to the future and provides a series of action points to revitalise primary health care, both nationally and globally.

WHO's vision for health—complete physical, mental, and social wellbeing—is the key to achieving Alma-Ata's prime goal of "health for all". This week's research articles also focus on these three principles. Stephen Tollman and colleagues discuss the challenges in managing chronic diseases in primary health care and the importance of providing adequate services to ensure physical wellbeing. Atif Rahman and co-workers tackle mental health in Bangladesh, with a psychological intervention that can be delivered within communities to treat mothers with perinatal depression. And the importance of social development is shown by Luis Huicho and authors who present data from four countries highlighting the importance of health workers with shorter durations of training in providing vital care to people in low-resource settings.

Importantly, WHO, under Margaret Chan's effective leadership and together with her regional directors, has reaffirmed its commitment to primary health care. This revisioning of the principles of Alma-Ata is welcome and illustrates a new unity of purpose across global health institutions. Political progress is also encouraging. Following the G8 meeting earlier this year, Japan has announced its own commitment to lead international initiatives to strengthen health systems. Such renewed global interest in primary health care is promising. The need remains great and there are no shortcuts to success. But with refined international relationships, new and emerging technologies, and 30 years of experience, "health for all" need not be a dream buried in the past. The right to the highest attainable standard of health can be a reality within our grasp. ■ *The Lancet*

WHO

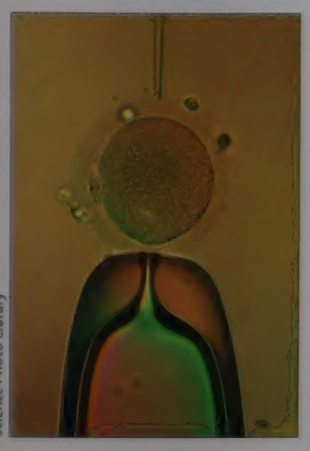
See **Comment** page 865

See **Articles** pages 893, 902, and 910

See **Series** pages 917, 928, 940, 950, 962, 972, 990, and 1001

For the **original Alma-Ata Declaration** see http://www.who.int/hpr/NPH//docs/declaration_almaata.pdf

IVF—one or two embryos?



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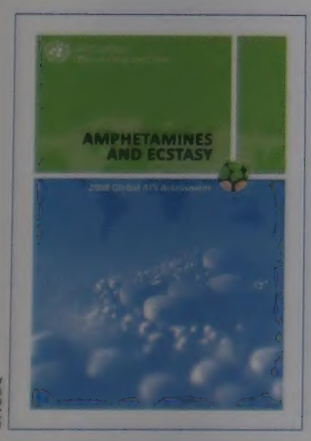
The British Fertility Society and the Association of Clinical Embryologists have issued new guidelines about elective single-embryo transfer (eSET) in women attending for in-vitro fertilisation (IVF). The new guidelines followed a request by the Human Fertilisation and Embryology Authority (HFEA) to reduce the rate of multiple pregnancies from the current average of 24% to 9% in the next 3 years. Multiple pregnancies arise after IVF from the practice of transferring more than one embryo (double transfer is the norm). But multiple births carry a higher risk of neonatal and maternal morbidity and mortality.

The guidelines point out that, in a selected group of women with a good prognosis for a viable pregnancy, eSET is as effective as double-embryo transfer. That group includes those aged under 37 years, and in their first cycle of ovarian stimulation with several high-quality embryos that can be frozen for subsequent use if needed.

However, there is a mismatch between HFEA's hope for a reduction in multiple births after IVF and the hopes of women who have to undergo ovarian stimulation and embryo transfer. In some European countries, eSET is already the norm. But, in the UK's two-tier health system, about three-quarters of IVF treatments are paid for by patients, who obviously want the maximum chance of becoming pregnant. Additionally, although the National Health Service is meant to provide three cycles of treatment, as recommended by the National Institute for Health and Clinical Excellence, only about a tenth of trusts meet that expectation. Thus, in both the private and public sectors, two embryos are usually implanted to increase the chance of pregnancy, albeit at the risk of a multiple birth.

According to the guidelines, trusts will save costs if eSET is used, because they will avoid the extra costs associated with treating the potential long-term health sequelae in children and mothers after a multiple birth. There is also good evidence, say the guidelines, that milder ovarian stimulation followed by eSET is as cost effective as conventional stimulation and double-embryo transfer. But persuading women of the benefits of eSET will not be easy. ■ *The Lancet*

A developing drug problem



UNODC

For the **UNODC report** see http://www.undoc.org

The recreational use of amfetamine, metamfetamine, and ecstasy (methylenedioxymethamfetamine) has typically been associated with dance parties and clubs in developed countries. But times are changing, according to a new report published by the UN Office on Drugs and Crime (UNODC). Over the past few years, the consumption of these drugs has increased in developing countries.

UNODC's *Amphetamines and ecstasy—2008 global ATS [amfetamine-type stimulants] assessment* shows that the reported use of these drugs in North America and Europe has stabilised or declined between 2002 and 2006. Over the same period, the use of amfetamines has increased in South America and the Middle East and the use of ecstasy has increased in South America, east and southeast Asia, and Africa. The prevalence of drug use in these regions is still low, with less than 1% of the population using them, but trends suggest that drug abuse is becoming a problem for developing nations.

What are the health risks? Ecstasy tablets, which are expensive to manufacture, can be doctored with cheaper toxic substances that mimic the drug's effects. Fatal reactions to the drug (or altered versions of the drug) have been widely publicised in developed countries. However, these adverse events are rare. Mental-health problems such as psychosis can occur in heavy users of amfetamines. Crystal metamfetamine, which can be smoked or injected, poses further health-risks for users, such as infections from used needles.

Many developing countries are ill-equipped to deal with the prevention of drug abuse and the treatment of users. They will need external support to collect accurate data on drug use, provide health information to high-risk users, and introduce harm-reduction strategies. Law enforcement to reduce the supply and demand of illicit drugs is a necessary step. But a balance is needed. Some countries have launched a "war on drugs" that has solely focused on punishment, and not only of drug manufacturers, traffickers, and dealers, but also of users. This response is detrimental to data collection and ultimately the health of drug users. Developing countries should tackle their emerging drug problems with public-health measures, not punishment, in mind. ■ *The Lancet*

Return to Alma-Ata

30 years ago, the Declaration of Alma-Ata articulated primary health care as a set of guiding values for health development, a set of principles for the organisation of health services, and a range of approaches for addressing priority health needs and the fundamental determinants of health.

The ambition, which launched the health for all movement, was bold. It assumed that enlightened policy could raise the level of health in deprived populations and thus drive overall development. The Declaration broadened the medical model to include social and economic factors, and acknowledged that activities in many sectors, including civil society organisations, shaped the prospects for improved health. Fairness in access to care and efficiency in service delivery were overarching goals.

With an emphasis on local ownership, primary health care honoured the resilience and ingenuity of the human spirit and made space for solutions created by communities, owned by them, and sustained by them. Above all, primary health care offered a way to organise the full range of health care, from households to hospitals, with prevention equally important as cure, and with resources invested rationally in the different levels of care.

The approach was almost immediately misunderstood. It was a radical attack on the medical establishment. It was utopian. It was confused with an exclusive focus on first-level care. For some proponents of development, it appeared cheap: poor care for poor people, a second-rate solution for developing countries.

Nor could the visionary thinkers in 1978 have foreseen world events: an oil crisis, a global recession, and the introduction, by development banks, of structural adjustment programmes that shifted national budgets away from the social services, including health. As resources for health diminished, selective approaches using packages of interventions gained favour over the intended aim of fundamentally reshaping health care. The emergence of HIV/AIDS, the associated resurgence of tuberculosis, and an increase in malaria cases moved the focus of international public health away from broad-based programmes and towards the urgent management of high-mortality emergencies.

In 1994, a WHO review of world changes in health development since Alma-Ata bleakly concluded that the goal of health for all by 2000 would not be met.[1]

See Editorial page 863

What can be gleaned from the experiences of a movement that failed to reach its goal? Apparently, quite a lot. Today, primary health care is no longer so deeply misunderstood. In fact, several trends and events have clarified its relevance in ways that could not have been imagined 30 years ago. Primary health care increasingly looks like a smart way to get health development back on track.

The Millennium Declaration and its Goals breathed new life into the values of equity and social justice, this time with a view towards ensuring that the benefits of globalisation are more evenly distributed between countries. The AIDS epidemic showed the relevance of equity and universal access in a substantial way.[2] With the advent of antiretroviral therapy, an ability to access medicines and services became equivalent to an ability to survive for many millions of people.

Stalled progress towards the health-related Millennium Development Goals forced a hard look at the results of decades of failure to invest in fundamental health infrastructures, services, and staff. As we have seen, powerful interventions and the money to purchase them will not buy better health outcomes in the absence of efficient systems for delivery.[3]

The rise of chronic diseases has uncovered further problems: the burden of long-term care on health systems and budgets, the costs that drive households

WHO

International conference on primary health care, Alma-Ata, 1978

below the poverty line, and the need for prevention in a situation in which most risk factors lie outside the direct control of the health sector.[4] In other words: fairness, efficiency, and multisectoral action.

In August, 2008, the Commission on Social Determinants of Health issued its final report.[5] Its arguments make a compelling call for close attention to health in all governmental policies, in all sectors. Gaps in health outcomes are not a matter of fate—they are indicators of policy failure. Not surprisingly, the report champions primary health care as a model for a health system that acts on the underlying social, economic, and political causes of ill health.

In October, 2008, WHO will issue its *World Health Report* on primary health care. Timed to commemorate the Alma-Ata anniversary, the report offers practical and technical guidance for reforms that can equip health systems to respond to health challenges of unprecedented complexity. Although the report does not aim to launch another social movement, it does ask political leaders to pay close attention to rising social expectations for health care—care that is fair as well as efficient, and incorporates many of the values so brilliantly articulated 30 years ago.

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I declare that I have no conflict of interest. WHO retains copyright on this Comment.

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From Alma-Ata to Agincourt: primary health care in AIDS

See **Articles** page 893

The often accompanying crises in serious epidemics—food, energy, and water—are dramatic reminders of failures to invest wisely in communities and respond effectively to a changing global landscape. We need fresh solutions to prevent disease and sustain life. Stephen Tollman and colleagues,[1] in today's *Lancet*, provide a rare glimpse into changing patterns of death in Agincourt, a rural South African community. In doing so, they draw attention to the need to re-organise services for primary health care to respond to these emerging epidemics: an important challenge for many low-income settings that are experiencing the double burden of infectious and non-communicable diseases.

The Agincourt population faces a tide of HIV and tuberculosis, together with an increasing burden of non-communicable diseases—the twin scourges of many developing countries. By presenting causes of death, Tollman and colleagues document a mortality transition over a 13-year period. Although the prevalence of non-communicable diseases was generally low in those aged younger than 65 years in the study, there was evidence that such diseases are being detected at a younger age. The major strengths of the study are its quality of longitudinal data, population size, use of a validated instrument for verbal autopsy, and rigorous data management.

Tollman and colleagues' key findings suggest that models of primary health care introduced almost 40 years ago, and derived from the Alma-Ata Declaration, are now no longer valid. These early recommendations promoted, among other things, delivery of primary health care that was appropriate for acute infectious and nutritional diseases. Yet, in much of contemporary Africa, chronic infectious diseases coexist with chronic non-communicable diseases[2–4] (although HIV is still largely managed as an acute illness), with reliance on physician-led diagnosis and management. This approach is overwhelming already overburdened health systems and is not sustainable much longer. New thinking is needed to develop decentralised models of primary health-care services that integrate management of chronic infectious diseases with that of chronic non-communicable diseases. Tollman illustrates this approach by showing how the management of HIV/AIDS and cardiovascular and metabolic disorders potentially overlaps. The approach in primary health care

of integrating the management of chronic infectious diseases with that of chronic non-communicable diseases will find supporters among those who favour a diagonal approach to health care, in which the response to an urgent problem is facilitated to improve services for other disorders.[5]

Mortality data, which are the main thrust of Tollman and colleagues' paper, do not fully reflect health and disease. Previous findings from Agincourt[6] revealed important information about risk factors for non-communicable disease and morbidity, including hypertension, female obesity, male smoking, subclinical atheroma, and a stroke prevalence double that seen in other parts of Africa. Details of risk and morbidity data are provided in a webtable in Tollman's paper. Together these data imply a later stage in the health transition than elsewhere in Africa, but show similarities to another rural area of South Africa where a population-based survey has also shown a high prevalence of overweight people, obesity, and hypertension in the adult population, especially those without HIV.[4] This burden of non-communicable diseases will be further uncovered as scaled-up treatment programmes lead to reduced mortality from HIV/AIDS.

Tollman and colleagues' expectation that integrated primary chronic care will be better than the current system does not entirely follow from their data. They do, however, provide some support for their argument by showing that stratification of health problems in Agincourt according to types of health-service needs would favour chronic care. A Cochrane review, which assessed strategies for integrating primary health-care services in low-income and middle-income countries, found few studies of good quality and no consistent pattern.[7] Tollman, rightfully circumspect, points out that integration will have to be carefully shown in properly conducted trials that could explore novel ways of integrating primary health care. The health transition they describe spans an unprecedented number of transitions[8] in the country, which are epidemiological, demographic, political, migratory, and socioeconomic. Welfare services for previously disadvantaged people have expanded enormously since South African independence in 1994.[9]

The extent to which the Agincourt experience can be directly translated to other regions in Africa depends on variations in context,[10–12] which will affect the configuration of primary health-care services. The challenge for policy makers is how to integrate health systems, which are currently fragmented, based on a series of vertical programmes, and dependent on physicians. Integration on a small scale can be achieved with relatively little effort. For example, in an attempt to further coordinate the integration of tuberculosis and HIV services in a subdistrict, a new daily cough clinic was established at Hlabisa Hospital, northern KwaZulu-Natal, South Africa. The clinic operates from a portacabin adjacent to the antretroviral clinic (figure). Patients with a cough, or referred from the antretroviral clinic are screened for tuberculosis by a nurse who takes a history and arranges for an immediate chest radiograph. Every patient is then seen by a physician (20 patients daily). All patients are offered HIV testing on the same day in an adjacent portacabin, and uptake is over 80%.

Figure: **Integration of tuberculosis and antiretroviral services at Hlabisa Hospital, northern KwaZulu-Natal, South Africa**
ART=antiretroviral.

On a larger scale, however, re-organisation of primary health-care services, extending from those envisaged by Alma-Ata to the integrated management of chronic diseases, requires a major shift. On the basis of our experiences in KwaZulu-Natal in dealing, at different locations, with either fragmented or unified services for tuberculosis and HIV, such shifts include the need for changes in the current legal framework to allow more tasks to be done by alternative cadres of health workers, and careful assessment.

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Perinatal depression treated by community health workers

See Articles page 902

Most depressed individuals never seek or get the right help, and endure long periods of disability. When mothers with newborn babies are affected, depression becomes more menacing, the mother being unable to care effectively for her baby.[1] Several studies, particularly from south Asia, show high rates of depression in mothers, often associated with severe social adversities.[2–4] The adverse impact of maternal depression on children includes low birthweight, undernutrition and stunted growth, episodes of diarrhoea, and incomplete immunisation.[5,6]

But the challenge of delivering effective interventions seems insurmountable. After all, despite strong evidence that brief psychological treatments are effective, they are of little use where there are no mental-health professionals to deliver such treatments. Furthermore, concepts of mental health vary widely between cultures, which potentially undermines the generalisability of psychological treatments from the developed world.

For these reasons, we celebrate the landmark cluster-randomised trial from rural Pakistan in today's *Lancet*. Atif Rahman and colleagues[7] show that a cognitive behavioural intervention, suitably modified for this setting and delivered by community health workers with 3 days of training along with intensive monthly group supervision, had an impressive effect on improving recovery rates of mothers who had depression, and that this effect was sustained for 1-year of follow-up.

Apart from being the largest trial of the treatment of depression by community health workers, Rahman and colleagues' study is also the first from a developing country to show benefits for the baby. Babies of mothers who received the intervention had better outcomes than those who did not for many indicators (increased coverage of vaccination, fewer episodes of diarrhoea, good participation in play activities by both parents), whereas mothers were less disabled, reported more social support, and more likely to take up contraception. Disappointingly, they were unable to detect any effect on their primary child-growth outcomes, although perinatal depression in mothers was a strong and independent risk factor for undernutrition in the intervention group.

Although Rahman and colleagues' trial is cause for optimism for global mental health, some challenges remain. Identification of perinatal depression in mothers was not done routinely by the community health workers. The community health workers who delivered this intervention were motivated and received supervision. However, not all developing countries have an established system of well-trained community health workers and in those that do, scaling up this intervention would require inbuilt mechanisms of good-quality training, supervision, and monitoring. Persistent depression in many mothers, even in the intervention group, points to the need for a stepped-care approach in which mothers who do not respond to this low-cost intervention are referred for drug treatment or specialist care (assuming, of course, such care is available).

Nevertheless, this trial has important implications for developing and developed countries, albeit with a divergent emphasis. For developing countries, the results show that a technically sophisticated psychological intervention for depression can be modified for different

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cultures, and taught to community health workers who can provide a range of other maternal and child health-care interventions. When the intervention is delivered in the antenatal period to mothers who are depressed, and continued well into the first postpartum year, benefits for both the mother and child were seen. These benefits were evident in an environment with a high burden of other adversities, including poverty, gender-based violence, and poor maternal and child-health care.

The message is clear: this intervention should be available as routine to all women who need it. Further research needs to examine the feasibility and effectiveness of placing this intervention into the Integrated Management of Childhood Illness package or other maternal health and child-health programmes. Such assessment should include the effect on mother–child dyads, both for mothers who are detected as clinically depressed and for all mothers who are socially disadvantaged and therefore at risk of poor mental health (though not necessarily depressed).[8] Although the approach to depression might have small overall effects for some mother–child dyads, it might result in more population-level benefits and has the advantage of not requiring the crucial initial step of identification of depression.

Implications for developed countries are more delicate. Many countries, such as the UK, are facing a shortage of mental-health specialists to deliver psychological treatments for depression.[9] Governments are ratcheting up budgets to train new therapists. Rahman and colleagues' trial suggests that community health workers, most of whom had not completed high school,[10] can be trained in a short period to give advice and support, informed by the principles of cognitive behavioural therapy, with great effect. If one adds these findings to the existing evidence of the effect of lay health workers treating depression in rural African settings,[11] one is faced with the stark reality that a health system does not need expensive mental-health specialists to deliver an effective intervention for most people with the most common of all mental disorders.

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We declare that we have no conflict of interest

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Task shifting in health care in resource-poor countries

See Articles page 910

There is good evidence and compelling logic to support the principle of task shifting—ie, the allocation of tasks in health-system delivery to the least costly health worker capable of doing that task reliably. Luis Huicho and colleagues,[1] in today's *Lancet*, provide the most comprehensive study of this topic to date. They compared results across four countries and found that health workers with a shorter duration of training performed at least as well and sometimes substantially better than those with a longer duration of training in assessing, classifying, and managing episodes of routine childhood illness, and in counselling the children's carers.

Similar but less robust findings have been reported from other settings. For example, in Uganda, little difference was noted in the safety of medroxyprogesterone acetate injected by community-based health workers compared with more qualified workers in clinics.[2] In Mozambique, health professionals (mostly doctors) expressed confidence in the surgical skills of surgically trained assistant medical officers.[3] In some cases, some detriment in performance was seen when, for example, clinical officers did caesarean sections in Malawi: maternal deaths were 1·3% (in 0·9% of which additional anaesthetics training was provided) and perinatal deaths were 13·6%.[4] These numbers might be higher than the equivalent with a fully qualified surgical team but are far below those applicable in the absence of any intervention.[5]

Panos Pictures

Nevertheless, obstructions can get in the way of policy makers who allocate tasks among staff on the basis of cost-effectiveness. For example, in Uganda, the Professional Council of Pharmacists opposed the introduction of training for pharmacy assistants, and the Nurses and Midwives Council opposed the accelerated training of nurse assistants and failed to support the conversion of traditionally enrolled nurse training to enrolled comprehensive nurse training, a move designed to reduce specialisation.[6] Much evidence about obstruction is anecdotal. For example, the Brazilian Medical Association stopped nurses from prescribing drugs, thus hampering the implementation of the Integrated Management of Childhood Illness programme.[7] Despite these obstacles, some countries have made good progress in spreading a range of tasks among various cadres of health workers who will improve access to essential care to remote populations.

In Ghana, task shifting was used long before the term came into vogue. The role of medical assistant was introduced in 1969 with a 1-year training, and focused on diagnosis and treatment of common disorders in places where doctors are scarce. In many rural hospitals, doctors trained nurses to take on some of their traditional tasks, such as draining small abscesses and monitoring of blood pressure, pulse, and temperature, which were local and expedient initiatives that were not part of a national policy. In the early 1990s, however, midwives started to be trained in manual vacuum aspiration to control uterine bleeding. And in the late 1990s, a training curriculum for health assistants whose role would be to support nurses was developed, although delays to national implementation led to uncoordinated local adoption until recently. A strategy to train substitutes for doctors was proposed in 2002.[8]

As in other countries, these initiatives were often resisted by professional bodies. The training of midwives in manual vacuum aspiration was at first resisted by obstetricians and gynaecologists on the grounds of safety, but as the midwives gained experience, this resistance weakened. Health assistants were initially called nursing aides but the Nurses and Midwives Council resisted any association of this less trained cadre with the label nurse. A 2004 proposal

to train medical assistants in minor surgery has been resisted by organisations for doctors and has not yet been approved.

Professional associations that seek to block moves to deliver effective essential care in remote populations will lose the trust of the public and increasingly be seen as promoting narrow economic interests of specific professional groups. However, the Ghanaian experience and evidence from Huicho and colleagues' paper suggests that resistance to appropriate and safe delegation of tasks can be countered by accumulating experience and constructive negotiations with professional bodies, for example, over job titles.

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Integration of personal and community health care

The promotion of primary health care since 1978[1] has had a profound political impact: it forced medical educators around the world to address the health needs of all people and it spurred the global recognition of family doctors as the primary medical providers of health care in the community. Yet, on the 30th anniversary of the Alma-Ata Declaration,[2] disillusionment with and failure to appreciate primary care's contribution to health persist. The missing link in the translation of the principles of Alma-Ata from idealism to practical, effective strategies has been the failure to integrate the perspective of personal and public health. The future of health care generally, and primary care specifically, depends on the integration of personal health care and public health at the level of the local community.

Many of the ills of developed health systems around the world reflect an over-reliance on medical technology and an over-estimation of the benefits of efforts to cure, rather than prevent, disease or to promote health. Meanwhile, the larger influences of social and economic determinants are under-recognised.[3] Better alignment of a public-health approach with personal health services will achieve a better balance, but the balance since Alma-Ata has tilted towards personal health care at the expense of population health. The challenge of this balancing act is illustrated in the interchanged use of the terms "primary care", which usually means care directed at individuals in the community, and "primary health care", which usually means a population-directed approach to health. To simplify this discussion and to reduce confusion, we will use the term "personal care" instead of "primary care" and "community-oriented primary care" (panel) instead of "primary health care".

Personal care has made substantial progress as generalists have provided care to individuals in the community, in the context of their everyday lives, without limits to health problem, age, or sex.[4] The increasing prevalence of multiple chronic conditions poses a growing public-health challenge and their successful management depends on lifestyle changes and intersectoral coordination of multiple services. Lifestyle modification requires an individualised approach that takes into account the individual's social context, just as comorbidities demand a comprehensive personal approach.[5,6] This is the value that primary care delivers to the overall performance of health-care systems.[7]

What is missing from this picture and what the skilled generalist remembers is that (individual) health

***Panel:* Community-oriented primary care**

Community-oriented primary care is systematic assessment of health-care needs in practice population, identification of community health problems, implementation of systematic interventions involving target population (eg, modification of practice procedures, improvement of living conditions) and monitoring effect of changes to ensure that health services are improved and congruent with community needs. Community-oriented primary care teams design specific interventions to address priority health problems. Team consisting of primary health care workers and community members assesses resources and develops strategic plans to deal with problems that have been identified. Community-oriented primary care integrates individual and population based care, blending clinical skills of practitioner with epidemiology, preventive medicine, and health promotion. By doing so, it tries to minimise separation between public health and individual health care.

and health care depend on taking into account the influences of and the context of the community. The concept "ecology of medical care"[8] emphasises the relations between the population and community, on the one hand, and personal health care, on the other. Therefore, understanding the practice population, with its most prevalent health problems and determinants of health has been at the root of the generalist resurgence of the 1970s and 1980s.[9] An essential frame of reference for generalist practice in its care for individuals is the population's attributable risk, based on knowledge of the actual population under care. This allows for a population approach as well as individual care, with priority setting, advocacy, and provision of personal care. While primary-care professionals have seen their professional status rise relative to clinical subspecialists, little attention has been given to their essential role of bridging from individual treatment of disease to community-oriented public health. Without losing the gains achieved in personal health care, the interface between personal and community health is where primary-care practices should develop in the coming years.

Health is about more than health care—socioeconomic conditions also determine health status and disease. Individual lifestyle interventions, such as smoking cessation and the promotion of healthy diets, are most effective when reinforced by supportive public-health policies (tobacco legislation, food-quality surveillance). This approach illustrates the public–personal health interaction. Primary medical care is at its most effective when it is directed at individuals from a defined and identified population: the practice population of patients.[7,10] Care for an identified population requires the practice, in its pursuit of personal care, to function with an orientation to the population: surveillance of the most important health problems and their determinants, planning of the most effective preventive and therapeutic interventions for the population, and advocacy to improve living conditions, while still providing individual health care.

It is time to integrate personal health care and public health, and organise primary care on the principle of care for individuals in the context of an identified population over time. The future of primary care, and health care in general, will depend on how effectively primary practices achieve this community-oriented primary care approach and contribute to equity and social cohesion.[11]

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Technology in global health: the need for essential diagnostics

Technology opens opportunities to address the components of primary health care described by the Alma-Ata Declaration, namely health education, proper nutrition, safe water, maternal and child care, immunisation, prevention and treatment of local diseases, and provision of essential drugs. But the Declaration used the word just once, describing primary health care as being based on "scientifically sound technology made universally accessible at affordable cost".

To us, "scientifically sound" and "universally accessible" are the key descriptors, each requiring separate calls for action. Development of scientifically sound technologies is an upstream process involving laboratory research and field assessment. Certain technologies, such as an effective HIV microbicide or new supplements to combat malnutrition, can provide enormous improvements in health by leapfrogging more intractable challenges. Since Alma-Ata we have seen the proliferation of public–private partnerships that aim to develop such "leapfrog" technologies, particularly drugs and vaccines for HIV, malaria, and tuberculosis.[1] These products are undoubtedly needed, but we should recognise that technology development can be serendipitous and its effects surprising. To take one example, a recent analysis predicted that better enteropathogen diagnostics could deliver the world's greatest improvement in disability-adjusted life years, reducing stunting and its long-term consequences by 12·5%;[2–4] a simple, elegant test to detect faecal contamination could be transformational. But this huge potential may be difficult to achieve because priorities such as the UN Millennium Development Goals, which drive much of biomedical funding, target childhood mortality, not morbidity. New technologies might also help awaken the will for change.

Then there are the health technologies that are already scientifically sound but for which Alma-Ata's goal of universal accessibility is the hurdle. Accessibility can fail for diverse reasons, from poor acceptance to shortcomings of provision or infrastructure. Clean water can be delivered with technology as simple as boreholes and latrines, but 1·1–2·6 billion people lack access to these.[5] In terms of provision, witness the cryptococcal antigen test, a highly sensitive diagnostic method that identifies the need for treatment of cryptococcal meningitis, a fungal disease common in AIDS. This technology has existed since the 1960s in a straightforward latex-agglutination form,[6] but it is unavailable throughout most of Africa, which is a sad irony because the treatment for the infection, fluconazole, is available in much of the region through a donation programme.[7] Cost of technology is of course one issue: no matter how efficiently produced, products from developed countries are simply unaffordable in the poorest countries. Notably, HIV assays used in much of Africa are manufactured in Ireland, Korea, Japan, and so on and incur high costs and erratic supply. Philanthropic donation can help meet high costs and has increased since Alma-Ata (for example, Pfizer's donation of fluconazole and Merck's of ivermectin), but these exceptional programmes are few and insufficient.

A more sustainable solution is to augment production of health technologies locally which, although well underway with booming biotechnology industries in India, China, and Brazil, has generally not trickled down to the poorest areas. An exception comes from bednets: in Arusha, Tanzania, a local textile manufacturer has retooled itself, now profitably making 18 million bednets each year with longlasting permethrin granules provided royalty-free from Sumitomo Chemical (figure). This venture both supplies a crucial health-improving technology and provides wages that can pay for good-quality health care if needed. Such technology-transfer schemes are needed to improve the supply of and demand for health products in the next 30 years,

Figure: Local production of insecticidal bednets to prevent malaria in Arusha, Tanzania

but they will require innovative relations between the health-care and business sectors.

Historically, the emphasis for health technology has been on drugs—starting in 1977 when WHO published the Model List of Essential Medicines, a valuable document that provides countries and organisations with vetted guidance on drug choices.[8] Alma-Ata maintained this emphasis, describing the need for provision of essential drugs, as did UN Millennium Development Goal 8e. Mention of other technologies, such as diagnostics, was lacking. Yet our knowledge of pathogens and diseases has expanded, and better diagnostic resolution is needed for 21st-century health care. Much of the problem of drug-resistant tuberculosis ironically stems from the insensitivity of sputum smear for diagnosis and unavailability of culture and drug-resistance testing. Interestingly, one expert panel ranked tests for infectious diseases as the most important biotechnology for improvement of health in developing countries, ahead of drug discovery, vaccine development, and genetically modified crops.[9] In this new era, we could use a WHO Model List of Essential Diagnostics to guide policy and research and to advance Alma-Ata's aspirations of better health for all.

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Child mortality 30 years after the Alma-Ata Declaration

The 30th anniversary of Alma-Ata provides a tremendous opportunity to galvanise the increasing political commitment and global momentum behind meeting the health-related Millennium Development Goals (MDG). MDG 4 calls for a two-thirds reduction in mortality of children aged less than 5 years between 1990 and 2015. Accurate and timely estimates of childhood mortality are needed to help countries set priorities, to design programmes, and to monitor progress. Such estimates are challenging to make because data are scarce in many developing countries. In response, in 2004, experts at UNICEF, WHO, the World Bank, the UN Population Division (UNPD), and members of the academic community, formed the Inter-Agency Group for Child Mortality Estimation. The IGME aims to produce best estimates on levels and trends in child mortality worldwide, to improve and harmonise methods across partners, and to source and share new data on child mortality. Each year, UNICEF, on the basis of work of the IGME, publishes the latest summary data on global mortality in children under 5 years of age as they become available. Detailed national estimates of mortality, trend analysis, and other indicators are then published in the annual *The State of the World's Children* report. Further analysis along with other policy and programme data are also presented every 2–3 years as the Countdown to 2015, involving UNICEF, WHO, UN Population Fund (UNFPA) and a range of civil society, academic, and donor partners.[1]

Current methods for estimation of mortality in children aged less than 5 years are described in detail elsewhere.[2] Because developing countries often lack vital registration systems that can provide nationally representative estimates, household surveys, such as the UNICEF-supported multiple indicator cluster surveys and the USAID-supported demographic and health surveys have become the primary sources of data on child mortality. On behalf of the IGME, UNICEF and WHO compile national estimates from these surveys and other data of sufficient quality and representativeness, including reproductive

health surveys, vital registration, and population censuses. A regression curve is then fitted to these data points and extrapolated to a common reference year to produce a smooth trend. Country estimates and the child-mortality database are made publicly available as the IGME agrees on the estimates.[3]

As well as including new data from household surveys, methods have been revised to include an adjustment for AIDS-related deaths. Analysis of household surveys had indicated that survey-based estimates underestimated deaths among children because of under-reporting of child deaths in households where mothers are absent due to AIDS-related death or illness. By contrast, rapid increases in coverage of HIV prevention and treatment in recent years are likely to have positive effects on child survival.[4] Estimates for 11 countries with the highest HIV prevalence, Botswana, Lesotho, Malawi, Namibia, Rwanda, South Africa, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe, include adjustments for HIV/AIDS.

In 1978, when the Alma-Ata Declaration was signed, nearly 15 million children aged less than 5 years were dying every year worldwide. In 1990, almost 13 million children died. Today, we publish new data indicating that around 9·2 million children died in 2007 (www.childinfo.org). Since 1990, mortality of children aged less than 5 years has declined by 27% from 93 per 1000 livebirths to 68 per 1000 livebirths in 2007 (table 1).

Furthermore, high levels of fertility in sub-Saharan Africa, together with high levels of mortality in children aged less than 5 years, have led to an increase in the absolute number of deaths (from 4·1 million in 1990 to 4·5 million in 2007). Sub-Saharan Africa now accounts for almost half of the of the 9·2 million deaths among children in this age group annually; and 7·5 million (82 %) occur in sub-Saharan Africa and south Asia combined (figure). Close to one in seven children in sub-Saharan Africa die before age 5 years (147 per 1000 livebirths). Table 2 lists the ten countries with the greatest annual reduction in child mortality since 1990.

The adjustments made for HIV/AIDS, however, indicate that mortality in children aged less than 5 years in some high HIV prevalence countries such as Botswana, Lesotho, and Swaziland, is beginning to decline. Mortality in Botswana is 40 per 1000 livebirths, indicating that it is on track for reaching MDG 4. More details on revised methods will be published online and in the *The State of the World's Children* report, 2009.

	1990	1995	2000	2005	2006	2007	Change 1990–2007 (%)
Mortality rates for children aged under 5 years (per 1000 livebirths)							
Sub-Saharan Africa	187	181	166	153	150	147	21 ↓
Eastern and southern Africa	166	158	145	129	126	123	26 ↓
Western and central Africa	206	201	185	174	172	169	18 ↓
Middle East and north Africa	79	67	57	49	48	46	42 ↓
South Asia	125	111	97	83	81	78	38 ↓
East Asia and Pacific	56	49	40	30	29	27	52 ↓
Latin America and Caribbean	55	44	35	29	28	26	53 ↓
Central and eastern Europe and Commonwealth of independent states	53	48	39	28	27	25	53 ↓
Industrialised countries	10	8	7	6	6	6	40 ↓
Developing countries	103	97	87	78	76	74	28 ↓
Least developed countries	180	166	149	134	132	129	28 ↓
World	93	88	80	71	70	68	27 ↓
Deaths in children aged under 5 years (in millions)							
Sub-Saharan Africa	4·1	4·4	4·4	4·5	4·5	4·5	10 ↑
Eastern and southern Africa	1·8	1·8	1·8	1·8	1·8	1·8	0
Western and central Africa	2·3	2·6	2·6	2·7	2·7	2·7	17 ↑
Middle East and north Africa	0·8	0·6	0·5	0·5	0·5	0·4	50 ↓
South Asia	4·7	4·3	3·7	3·1	3·1	3·0	36 ↓
East Asia and Pacific	2·1	1·7	1·2	0·9	0·9	0·8	62 ↓
Latin America and Caribbean	0·6	0·5	0·4	0·3	0·3	0·3	50 ↓
Central and eastern Europe and Commonwealth of independent states	0·4	0·3	0·2	0·2	0·2	0·1	75 ↓
Industrialised countries	0·1	0·1	0·1	0·1	0·1	0·1	0
Developing countries	12·5	11·7	10·4	9·4	9·3	9·1	27 ↓
Least developed countries	4·0	4·0	3·9	3·8	3·8	3·8	5 ↓
World	12·8	11·9	10·5	9·6	9·4	9·2	28 ↓

Table 1: **Mortality rates and number of deaths in children aged less than 5 years**

Substantial progress has been made towards the achievement of MDG 4; indeed, since the Alma-Ata Declaration in 1978, around 5·5 million fewer children aged less than 5 years are dying every year. Progress is still grossly insufficient, particularly in much of sub-Saharan Africa and south Asia. However, even in these regions, there are examples of poor countries, such as Eritrea and Bangladesh, proving that MDG 4 is achievable. Additionally, countries with high HIV/AIDS prevalence, such as Botswana, achieving high population-based coverage with critical HIV interventions might provide models for countries with similar epidemiological profiles. UNICEF will be investing more time in assessing why some countries are progressing well on the health-related MDGs and others are not.

Analysis of intervention coverage data[1,5] has added further clarity. Although findings are positive for interventions that either can be delivered through

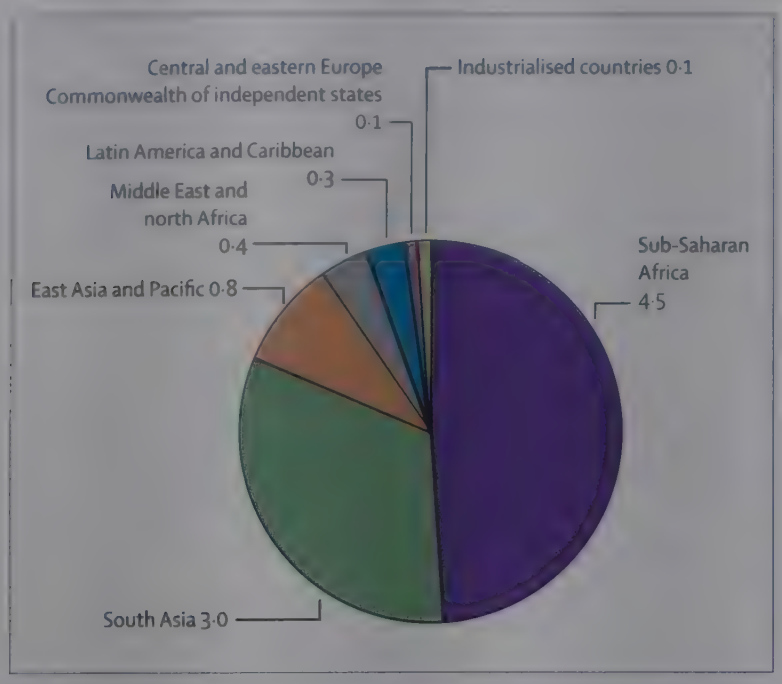
Central and eastern Europe Commonwealth of independent states 0·1
Industrialised countries 0·1
Latin America and Caribbean 0·3
Middle East and north Africa 0·4
Sub-Saharan Africa 4·5
East Asia and Pacific 0·8
South Asia 3·0

Figure: **Regional distribution of the 9·2 million children who died in 2007 before they reached their fifth birthday**

	1990	1995	2000	2005	2007	Average annual rate of reduction
Haiti	152	141	109	84	76	4·1
Eritrea	147	122	97	78	70	4·4
Laos	163	131	101	79	70	5·0
Bangladesh	151	122	91	68	61	5·3
Bolivia	125	105	84	65	57	4·6
Nepal	142	117	85	62	55	5·6
Turkmenistan	99	87	71	55	50	4·0
Mongolia	98	82	63	48	43	4·8
Botswana	57	70	87	44	40	2·1
Azerbaijan	98	93	69	46	39	5·4

Mortality rates 1000 livebirths. All are on track for meet MDG 4.

Table 2: **Countries making the greatest progress in reducing mortality in children aged less than 5 years, 1990–2007**

outreach or basic health services (such as immunisation, vitamin A supplementation, and insecticide-treated bednets) or part of high-profile disease-specific initiatives (eg, prevention of mother-to-child transmission and paediatric antiretroviral treatment), coverage for other interventions is lagging. Particularly disappointing is the low coverage of services for pneumonia and diarrhoea treatment and the breakdown of the continuum of care.[6] UNICEF and the Countdown 2015 partners are working with the Inter-Parliamentary Union to ensure an understanding of these data at the national level and to determine the best national responses.[7]

UNICEF will be focusing its health-related programme investments, now approaching US$1·5 billion per year, on the expansion of integrated packages particularly focused at the community level to prevent, treat, and control moderate and severe acute malnutrition, pneumonia, diarrhoea, malaria, and other disorders. Working with WHO, UNFPA, WHO, and The World Bank, we will be giving renewed attention to maternal and newborn health, the subject of the 2009 *The State of the World's Children* report. The sub-Saharan Africa and South Asia regions will remain priorities. In keeping with the original principles of Alma-Ata, more attention will be given to ensure equity for the most underserved as intervention coverage increases. Furthermore, stronger links are being made between UNICEF-assisted health, water and sanitation, nutrition, and HIV programmes. Finally, more investments will be made to collect high quality data and continue to improve estimation methods.

Measures of intervention coverage emphasised in Countdown to 2015 will continue to be important. However, the ultimate measure of our efforts—on health system strengthening, in disease-specific work on measles, tetanus, HIV, and malaria, or in the myriad of global health partnerships and initiatives—will be a substantial and verifiable reduction in maternal and child deaths. We call upon others to join us in redoubling our efforts to meet these goals, by translating the laudable aspirations of Alma-Ata into the concrete investments and specific evidence-based actions at the country level, that will make the principles of primary health care a reality for the world's underserved.

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Cracks appear in Brazil's primary health-care programme

Brazil's strategy to deliver primary health care to millions of poor people has won widespread acclaim. But all is not well. The initiative's insufficient number of clinics and staff has put a strain on the country's under-equipped public hospitals. Michael Kepp reports from Rio de Janiero.

Public health in Brazil gets high marks for having brought basic health care to millions of poor people previously denied it, but lower scores for the inadequate treatment they get at overcrowded, understaffed, and under-equipped public hospitals, say experts.

The resounding success of primary health care in Brazil is the result of the 1988 constitution, which made access to it a universal right. Before 1988, basic health care was available only to the 60% of the population who worked and paid social security taxes, as well as their dependants.

With the constitution, Brazil's national health system—Sistema Único de Saúde (SUS)—was created in 1988, initially providing basic health care to 30 million people. Today, 75% of Brazil's 190 million population benefits from public health care, managed and provided by all levels of government—municipal, state, and federal. The 25% of the public who can afford it, use private health-care plans linked to higher-quality private hospitals.

But virtually 100% of all HIV/AIDS patients get free treatment and medication from SUS as do nearly 100% of those who need costly haemodialysis and organ transplants. The Family Health Programme (PFS), created in 1994, when it began treating 1 million people, is Brazil's main delivery system for primary health care. Today, 28 300 teams of doctors, nurses, dentists in the programme treat 90 million people, over half the country's population, in nearly all Brazil's 5560 municipalities. These teams staff basic health clinics, mainly in urban areas, and visit the poor, mainly in rural regions. The programme's $2·4 billion annual budget accounts for 8% of the $30 billion government health budget in 2008.

The programme, which provides free vaccinations and treats the initial stages of many diseases, is the main reason why infant mortality has decreased by 60·5% since 1990 and why life expectancy for the average Brazilian has increased from 67 years in 1991 to 72 years in 2007.

> **"The resounding success of primary health care in Brazil is the result of the 1988 constitution which made access to it a universal right."**

"The Family Health Programme is SUS's biggest success story", said Francisco Batista Junior, the president of the National Health Council—a body that regulates and monitors public-health policy. "The programme's biggest problem is an insufficient number of clinics and of qualified and specialised health professionals, which causes more people to overcrowd an insufficient number of understaffed public hospitals."

Health minister José Gomes Temporão, also calls the initiative "a resounding success", but says that "the programme needs more medical professionals to treat the 15% of those within the PFS programme who require more specialised care".

That is why, since July, the ministry set up 160 clinics staffed with medical specialists and plans to create 600 more by the end of the year. The ministry also plans to set up 200 emergency clinics by year's end and 300 more by 2010. Temporão said that "these two new types of clinics will relieve public hospital overcrowding".

Overcrowding in public hospitals is the result of the government not building enough clinics or public hospitals to provide care for the millions of poor people entering SUS after 1988. Public hospitals now provide only 35% of SUS beds, whereas government-contracted private ones provide 65% of them. But only 10–15% of these private hospitals offer high quality medical care—well trained doctors and modern equipment, say public-health experts.

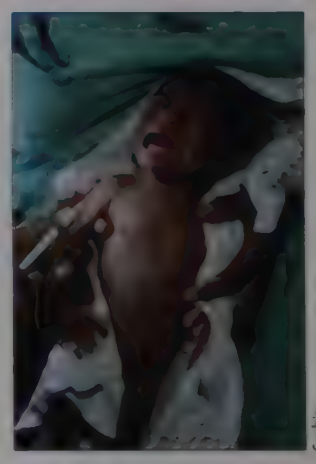
"SUS best takes care of those who need primary health care", said Pedro Cardoso, a professor of public-health management at Rio de Janeiro's National School of Public Health. "SUS falls way short in providing decent hospital care, which is more complex and more costly."

The government never built enough public hospitals because it never had the money. When SUS was conceived in 1988, no funding system—eg, a fixed percentage of tax revenues—was created to guarantee it adequate financing. SUS is sustained by annual government budget allotments for public health, an amount which fluctuates yearly.

"The government's failure to guarantee sufficient financing to SUS is its Achilles' heel", said Julio França, a public-health professor, at Rio de Janeiro's health-research centre Fundação Oswaldo Cruz. "Without such financing, SUS will have neither the money nor the manpower to treat all those who need to be hospitalised."

Even health minister Temporaõ said that "SUS needs at least 50% more funding than it currently has. The ministry's budget of $30 billion per year to cover the public-health needs of 190 million people means that we have only $158 per person to spend on public health each year, which is way too little".

Michael Kepp



Corbis

The Family Health Programme provides free vaccinations

Can public-private partnerships improve health in India?

Public-private partnerships have sprung up in several states in India to deliver primary health care to rural populations. Bharathi Ghanashyam takes a look at one example and asks experts whether similar partnerships should be scaled-up to cover the country's entire health sector.

Pattanayakanahalli village lies at a distance of about 172 km from Bangalore on the Bangalore–Mumbai highway in Southern India. 18 km from the nearest town, it is home to a population that is largely made up of landless farmers and small farm holders. Most of these people live below the poverty line and earn less than US$420 each year.

The village houses a government Primary Health Centre (PHC) that provides services to 47 surrounding villages, and a population of around 39 000 people 24 h a day 7 days a week.

It is 12 noon and the outpatient department in the PHC is overflowing with people who have come in with common ailments.

33-year-old Satyamma, however, is not just a routine patient. She has been married for 16 years and is childless. After two abortions and the death of one child who was born with abnormalities, she is in the third month of her fourth pregnancy and is anxious about how it will progress. The gynaecologist who is visiting from Bangalore examines her and reassures her that all will be well. Satyamma is under the care of a private gynaecologist and has come in only for a second opinion. At the end of the examination she shyly inquires whether she can continue visiting the PHC for the rest of her pregnancy.

"In 1983, the country's National Health Policy adopted the Alma-Ata definition of primary health care to mean the provision of curative, preventive, promotive, and rehabilitative health services."

Another patient—66-year-old Kadirappa—is recovering from tuberculosis and is on the DOTS regimen. He recalls his innumerable trips in the past to private doctors, who he says, merely offered him symptomatic treatment. At the end of 2 months he had spent around Rs2000/- ($46), which he had to borrow, and was much worse off than he was when he began treatment. A relative referred him to the PHC where his condition was diagnosed. 2 months later, he is feeling much better and, with encouragement from the PHC staff, he says he will complete his treatment.

Nagaraj, who has recovered from tuberculosis, has just been diagnosed as HIV positive. He was tested for HIV/AIDS as part of the routine screening for tuberculosis patients at the PHC. The test was done after he was counselled at the integrated counselling and testing centre at the PHC. He is now being persuaded to begin antiretroviral treatment as his CD4 cell count has fallen below desirable levels.

Satyamma, Kadirappa, and Nagaraj have one thing in common: they have all used the facilities offered by the Pattanayakanahalli PHC, some of which are unique to it and are not offered at other PHCs. This is because the PHC is being run in a public-private partnership between two entities: Karuna Trust—a public charitable trust based in Bangalore—and the Government of Karnataka—a southern state of India.

Karuna Trust also manages 25 other PHCs across the state of Karnataka, as well as nine in Arunachal Pradesh in northeast India. It has ensured that PHCs under its management provide round-the-clock emergency and casualty services, outpatient facilities 6 days a week, a five to ten bed in-patient department, and 24 h labour and essential obstetric facilities. Additionally, the Trust has introduced innovations such as integration of mental health services, eye care, and specialist services at primary care level.

Karuna Trust has come a long way since taking over the management of its first PHC at Gumballi in Karnataka in 1996 (see table). Its success has led the Karnataka Government to issue a formal policy on public-private partnerships in 2000.

Still Pictures

Patients at a public health centre in Karnataka

India is a signatory to the Alma-Ata Declaration, which calls for "Health for All" to be achieved in countries through a primary health-care approach. In 1983, the country's National Health Policy adopted the Alma-Ata definition of primary health care to mean the provision of curative, preventive, promotive, and rehabilitative health services. This development was a shift from curative to integrated health care with an emphasis on increasing access to health services in rural areas.

To give form to this commitment, a huge infrastructure was established, consisting of a three tier system ie, primary, secondary, and tertiary care. PHCs are units that provide integrated rural health care and also provide referral to secondary and tertiary care. Each PHC covers a population of 20 000–30 000 people. India has about 23 000 PHCs, 130 000 subcentres, and 150 000 health-care institutions. Karnataka alone has 2193 PHCs. The state of these centres, however, leaves much to be desired.

Hanumappa Sudarshan, founder of Karuna Trust says, "Notwithstanding the infrastructure available, all is not well with the primary health-care system. It has become decrepit and use of PHCs has fallen to abysmal levels, thereby necessitating the involvement of civil-society organisations to shore up the deficiencies."

Studies indicate that only 69% of PHCs in India have at least one bed. Absence rates among health workers range between 35–58% in different Indian states. Devi Shetty, chairman of the Narayana Hurudayalaya Institute of Cardiac Studies, points out, "Insufficient staff, unavailability of essential drugs, and other problems at government-run PHCs make it difficult for rural communities to get treatment and they are forced to purchase health-care services from private practitioners. The greater danger, however, is that they will delay accessing treatment for fear of losing wages and bearing out-of-pocket expenses". He speaks from ground-level experience, since his institution has established, and runs, 16 PHCs as part of a pilot programme in Amethi in Uttar Pradesh.

The National Family Health Survey 2005–06 revealed that 46% of children below the age of 3 years are underweight. India's infant mortality rate is 57 per 1000 livebirths and its maternal mortality ratio is 301 per 100 000 livebirths and should be reduced to below 42 and 109, respectively, to achieve Millennium Development Goals 4 and 5 on child and maternal health. India also has the largest pool of never-immunised children in the world—9·4 million. These are results that the primary health-care system must account for.

"Primary health care must never be sold and, as a nation, we cannot afford profit at the expense of the poor."

Despite its firm commitment to providing primary health care, why has India failed on so many counts? Madabhushi Madan Gopal, secretary of the Health and Family Welfare Department, Karnataka says, "The government lacks managerial skills and professionalism. We have also fallen behind in establishing community rapport and enabling convergence between the various departments that look at health, water, and sanitation etc".

Since public-private partnerships translate into benefits for those seeking health care, should they be scaled-up to cover the entire sector? Sudarshan disagrees firmly. "Primary health care is the responsibility of the state. PPPs [public-private partnerships] are not alternatives to poor governance and leadership. Even with the PHCs we manage there are variable degrees of progress. In districts where the District Health Officer understands the rationale of the PPP and provides constructive leadership, the progress has been tremendous. In others, progress has been slow. PPPs can work only with the support of strong, honest, and able governance."

	Gumballi PHC (2006)	State
Crude birth rate per 1000 population	17·5	20·1*
Crude death rate per 1000 population	4·6	7·7†
Infant mortality rate per 1000 livebirths	23·6	48·0‡
Perinatal mortality rate per 1000 livebirths	9·3	35·3†
Neonatal mortality rate per 1000 livebirths	13·9	28·9†
% of women receiving three postnatal checkups	100%	60%§
% of institutional deliveries	81%	65%§

Sources: PHC data from monthly reports of Gumballi PHC. *Sample Registration System data (2007), Government of India. †Sample Registration System data (2003), Government of India. ‡National Family Health Survey 3, Government of India (2006). §District-level Household Survey (2004), Government of India.

***Table*: Comparison of the Gumballi PHC's indicators with the state average**

Devi Shetty, however, strikes a different note. "I believe that primary health care must be offered free, but it is not mandatory for the government to do this. Governments across the world have failed in providing free primary health care to the community. Private players can provide better services as they operate to economies of scale, and bring in professionalism. If health insurance becomes mandatory, primary health services offered by the private sector will translate into benefits for the poor."

Madan Gopal believes, "primary health care must never be sold and, as a nation, we cannot afford profit at the expense of the poor. We need long-term planning and sustainable policies, as well as greater spending on health care. Partnerships to share skills and not substitution by business enterprises are what we require additionally. Most importantly, we need a community-centred approach to the health sector, as spelt out in the Alma-Ata Declaration, so that the community has a greater say and can force change".

Whether the primary health care in India will be opened up to the private sector remains to be seen. It is, however, a healthy sign that debate has begun.

Bharathi Ghanashyam

Extension workers drive Ethiopia's primary health care

Thousands of community workers are helping Ethiopia to deliver primary health-care services to people living in rural areas. But critics say the training these workers receive is not adequate for them to attend many of the health problems they encounter. Wairagala Wakabi reports.

Although it still has some of the worst health indicators in the world, Ethiopia is fast registering impressive successes in extending affordable primary health-care services across the country. These achievements are largely attributable to the Health Extension Programme which has been implemented since 2003, and through which the country hopes to achieve universal access to primary health care by 2009.

Coverage of publicly-funded health care has risen from 61% in 2003 to 87% in 2007, whereas total coverage—including services provided by private health facilities—has grown from 70% to 98% over the same period. The Health Extension Programme, which has enabled this success, aims to improve access and equity through provision of essential health interventions at the village and household level, with a focus on sustained preventive health actions and increased awareness.

The initiative deploys two salaried health extension workers at each village health post. Most of these workers are women who are recruited from the local communities in which they will work. New recruits complete a 1-year training course, which includes fieldwork, before taking up their posts.

Luwei Pearson, head of the health department at UNICEF Ethiopia, told *The Lancet* that a review completed last July by independent consultants with the input from WHO, the UN Population Fund, and UNICEF, showed that the Health Extension Programme had achieved great successes, helping to prevent communicable diseases and enabling effective community participation in the planning and implementation of health care. The care given under the programme covers disease prevention and control, hygiene and sanitation, family health services, and health education.

"...Ethiopia is fast registering impressive successes in extending affordable primary health-care services across the country."

According to the evaluation of the Health Extension Programme, the training and deployment of the health extension workers have been progressing according to plan. Some 24 534 workers gave been trained and deployed, representing 82% of the target.

"From several studies carried out so far, it appears the community engagement of the HEWs [health extension workers] in a number of regions is highly appreciated and seems effective. In those regions, HEWs work together with community health promoters, health workers, religious leaders, and community leaders", says the evaluation report. Most of the workers were said to be well organised in their activities and divided their time between the community and activities at health posts.

Female-headed households reported monthly visits by the extension workers and had received health education on various topics such as housing, food hygiene, waste disposal, immunisation, and family planning.

However, not all the news is positive. Tewodros Adhanom, Ethiopia's minister of health, says that workforce shortages still hamper delivery of health care. And analysts point out that the ability of the extension workers to deliver services will remain limited because of delays in the construction of health posts and the distribution of health kits, as well as inadequate supervision within the programme.

At the national level, the Health Education and Extension Centre is mandated to coordinate and monitor the activities related to the health extension programme. It is also responsible for the preparation of national health education standards and materials. But its effectiveness has been under question, and it is one of the departments that health minister Adhanom has said will be reformed.

Critics also say that the training which extension workers receive is not adequate for them to attend to many of the health problems they encounter and that the interaction between the workers and their referral health centres needs to be strengthened.

But despite these problems, the Health Extension Programme is largely seen as a big success. Adhanom says his country is on course to achieve primary health care for all by 2010, and praises the HEP for contributing to this milestone.

Wairagala Wakabi

Panos Pictures

Health education forms part of the Health Extension Programme

Book

Health in a just society

In Puccini's opera, candidates for Turandot's hand are given a fair choice: correctly answer three riddles and marry the princess; fail and be executed. No male, however ardent or focused on the main chance, is forced into it—he can choose. One could, therefore, argue that the process is fair. The outcome, as distinct from the process, is anything but: a trail of dead suitors and one chaste princess (until, of course, the tenor arrives which usually spells the end of the soprano's chastity). On this evidence—fair process versus fair outcome—would we deem the society in which Turandot was a princess to be a just society?

Clearly not, as we rig things in more subtle ways today. Most of us think a just society entails more than simply giving people "freedom" to choose. People's freedom is heavily influenced by inequalities in power, education, and resources—all socially determined—quite apart from inequalities based on the natural lottery that deals some with a luckier genetic hand than others. But what then constitutes the just society? One influential view is that of John Rawls's "justice as fairness". A key element of Rawls's theory is equality of opportunity. A just society guarantees every citizen basic or primary social goods, including basic liberties, opportunity, powers and prerogatives of office, income and wealth, and the social bases of self-respect. For Rawls fairness rests on a fair procedure by which these primary social goods are distributed. It is the process that decides justice not the ultimate allocation.

Rawls acknowledges that his principles for distributing primary social goods will not eliminate inequality. He is, however, concerned with the fate of those worst off. Therefore, his difference principle says that, while guaranteeing equal liberties to all, inequalities in the distribution of the remaining primary social goods are allowable only when the inequalities work to make those who are worst off as well as possible compared to alternative arrangements.

One strand of criticism of Rawls comes from Amartya Sen. Sen is concerned not just with process, but with one feature of the ultimate allocation: people's capabilities. For Sen, the focus of social justice should be on what people can be and do. The freedom to be and to do is not guaranteed by getting the distribution of social goods right. Where, for example, does health come into it? If, for whatever reason, people have ill-health, their ability to translate social goods into freedom to be and to do will be compromised. A fair distribution of social goods that does not take into account differences in health, skills, needs, and vulnerabilities will therefore not be enough.

> **"If we are one global community should we not care about global health inequalities as much as we care about health inequalities within our own society?"**

Norman Daniels, in his new book, *Just Health*, is concerned to take on this failure of Rawls to deal with health concerns. He does it, not by embracing capabilities as laid out by Sen, and Martha Nussbaum, but by sticking with a Rawlsian framework. It helps him to answer three rather important questions: does health have some special moral importance; when are health inequalities unjust; and how can we meet health needs fairly under resource constraints?

In my view, Daniels is on the side of the angels. His previous book, *Just Health Care*, used Rawls to argue for a fair distribution of health care. The Alma-Ata renewal of commitment to primary health care is a much needed way to address fair distribution of health services. *Just Health* goes further. It starts with a recognition that big inequalities in health within and between countries arise not only from inadequate, and unfair, distribution of health care but also from the social determinants of health. Justice, therefore, requires that we take action on the social determinants of health to reduce unacceptable health inequalities.

Just Health: Meeting Health Needs Fairly
Norman Daniels. Cambridge University Press, 2008. Pp 397. £16·99. ISBN 0-521-69998-3.

Daniels does us a great service by his introduction of an ethical dimension to his discussion of population health and the allocation of resources. His call for action on the social determinants of health to reduce avoidable inequalities in health is very welcome. Within this context of agreement I am not wholly convinced by his answer to his first key question. For Daniels, we care about health because improving health enhances opportunities. Improving health, therefore, contributes to Rawlsian justice. I am sure it does, but is that why we care?

As chair of the Commission on Social Determinants of Health, I have been pushing two arguments. First, everyone values health for its own sake; not simply for the opportunities it brings. I have been arguing that people would like to avoid heart attacks or malaria not because they might then get a better job or live in a better neighbourhood but because they value getting up in the morning free of major illness. Most certainly, health may lead to opportunities but that is not the only reason it is important. If it were would we say that premature death was only important because it restricted opportunities?

Second, I have, in a sense, been arguing that opportunities lead to health—ie, arguing the other way round from "health leads to opportunity". Better jobs, more just

distribution of power, the social bases of self-respect will lead to better health. So much so, that health and the distribution of health can be used to tell us how well a society is functioning and distributing its benefits. In this view, health, important for its own sake, is also important because it reflects—indeed, in large measure is determined by—the meaningful opportunities that society affords its members. This is a view well articulated by Sen and is consistent with his general view of Development as Freedom. Were I a signed-up Rawlsian, I might argue that Rawlsian justice would lead to better health rather than better health will lead to more Rawlsian justice. Daniels has earlier endorsed the view that Rawlsian justice is good for health.

There is a particular dilemma with which Rawlsians, and the rest of us, have to deal. Going back at least to Adam Smith, economists have argued that allowing some people to have a larger slice of the economic cake may lead to the whole cake enlarging. In other words, set the wealth producers free and, although they will benefit the most, people at the bottom will be somewhat better off—trickle down economics. I hear the distant rumble of self-interest promoting this view. What does Rawls say, given that his difference principle states that greater inequalities are fairer provided that the worst off are better off than they could be under any alternative arrangement? Does that mean that greater health inequalities might be fairer provided those at the bottom have improved more than they could have under alternative arrangements?

This is, after all, close to what has happened in many countries over recent decades. Health has improved for everybody but it has improved more for those in more privileged social and economic positions. Health improving for everybody has to be a most welcome social achievement but so would flattening the health gradient by levelling up.

Daniels's response is to work towards a situation where the health of the worst off is improved. Under the difference principle, writes Daniels, "equality of opportunity will not be undermined in the dramatic ways we now see in societies that tolerate whatever inequalities the market generates". Would this be more likely to lead to greater health equity than a Sen approach that privileges the freedom for all to be and to do?

Daniels finishes his book with a marker for the future: what do we owe each other globally? If we are one global community should we not care about global health inequalities as much as we care about health inequalities within our own society? If, however, we are self-contained nation-states, what business is it of ours if others have worse health? He sets the terms for the debate. It is a question well worth answering.

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La Americana
Directed and produced by Nicholas Bruckman. People's Television, 2008. See http://www.la-americana.com

In brief

Film Paying the price for care

Carmen Rojas left Bolivia in 2000. The USA denied her a visa, but she decided to enter the country anyway. Hidden in an aperture behind the back seat of a car, she was smuggled into the country where she finds, "I'm always in a hurry". She's a cleaner and dog-washer, a nanny and home-help. She needs the money for her daughter Carla, who remained in Bolivia with Carmen's mother. When she was 7 years old, Carla was hit by a bus. She lost the use of her legs and requires lifelong specialised care.

The first half of *La Americana* observes Carmen's exhausting New York routine. In the background the heated debate over immigration plays out, with neither side gaining much ground. The film then picks up the story in 2007. Carmen has returned to Bolivia. Carla is now 15 years old; she has a broken hip—it seems that a heavy-handed chiropractor is to blame. There's more bad news: there's a risk that Carla's other hip will break. Her knee is permanently bent. The recommended schedule of physical therapy will cost at least US$25 a week, a daunting amount given Carmen's low income. Hydrotherapy is more still, and Carla needs surgery to cure a bedsore. Then there are the taxi cabs to transport the wheelchair-bound girl.

Unfortunately, director Nicholas Bruckman does not subject Bolivia to the same kind of analysis as he does the USA. It's a frustrating omission: a few facts and figures about the Bolivian economy and health-care provision would have helped contextualise this family's plight. Instead, the audience is expected to assume that the country's defining characteristic is unmitigated poverty.

Still, it's a moving and thought-provoking documentary. We leave Carmen as she prepares to return to the USA. Carla's condition is degenerative, and there's no way her mother can accumulate enough money in Bolivia to pay for treatment. "I can spend all my money on food, or I can spend it on her therapy" Carmen points out "there's not much room for a choice".

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Profile

Mirai Chatterjee: securing work and health care for women in India

Mirai Chatterjee could probably have pursued a lucrative career in the UK or the USA, having studied in both. Instead, she chose to return to India to support the millions of working poor women whose health, and the health of their family, depends absolutely on the ability to earn however small an amount of money. Chatterjee is co-ordinator of the social security team of the Self-Employed Women's Association (SEWA), a union with 1·1 million members working in the informal economy in nine Indian states. Most of its members exist below the poverty line and the rest are hovering on it. SEWA, for the past 40 years, has given some of the poorest women—those who sell vegetables by the roadside, work at handlooms, or spend their days rolling beedi cigarettes—a safety net.

SEWA aims to tackle the social inequalities that underlie poor health and low life expectancy. It works with its members to organise child care, early education, and microfinance. Crucially, it offers low-cost health insurance policies that women can take out, so that they can get access to primary health care if they or their children fall sick—because either event can mean a slide into destitution for the working poor. The organisation was founded by Ela Bhatt 40 years ago in Gujarat, where Ghandi was born. "We believe we are continuing the unfinished business of Ghandijhi—that the poorest and weakest and most vulnerable must be in the centre of our endeavours", says Chatterjee. "That is the women of this country, who work so hard and yet their contribution to the Indian economy is not recognised. Basically, SEWA works for full employment. We have learned that, for the poor, work is a lifeline to survival. If you work, you survive."

SEWA is also a support network for these women. "Women always think of themselves as somebody's wife or mother, not active players in the Indian economy. That has changed now", says Chatterjee. She points out how "Initially the menfolk are not keen on anything which increases their women's mobility. But when she pays off the moneylender or brings in a new cow or buffalo because she took out a loan or she gets support in times of illness, then people start to think this may be a good thing."

Joining the union costs 5 rupees (11 US cents) a year. For 400 rupees, around $9, a woman can take out an annual insurance policy that covers her entire family. It can cover her husband as well, but she must be the policy holder. Health-care expenses up to 2000 rupees ($45) are covered, but SEWA has negotiated tie-ups with public hospitals and other health-care providers so the money goes further. SEWA also insures members for losses caused by accidental fire and floods. Those who cannot afford the premium can take out lesser cover for 175 rupees ($4). Some pay in instalments of 20 or 30 rupees a month. "The insurance programme encourages women to seek health care when they need it for the first time. When you are poor, unless you are at death's door you don't get yourself treated", she says.

Some of the care will be given by barefoot women doctors, members of the union who are given paramedical training by SEWA. They know when a child is going into respiratory distress, know what to do about diarrhoeal and skin diseases, and can take the patient to a doctor if necessary. Chatterjee says the women gain great strength and insight from the work. "When they are serving their communities, they have their heads held high."

Michael Marmot, Chair of WHO's Commission on Social Determinants of Health, was impressed by SEWA's success and Chatterjee became a member of the commission. Marmot notes that crucially "SEWA says we're not going to do it for the women—we are going to get the women organised so they can do it for themselves. They have had a close look at what these women need and want to make their lives better, which in turn would make their health better, and they try to organise to deal with every aspect."

Chatterjee has been working for SEWA since 1984. Marmot remarks on her self-effacing nature, which is part of the Ghandian tradition and also the union, which avoids singling out individual leaders. But, he says, "she is an amazingly articulate spokeswoman for what they do. She moves people in the way she talks." Walking the streets of Ahmedabad with her, he says, "There is enormous warmth between these humble women and this educated woman." Chatterjee says the gulf between the rich and the poor began to bother her as she was growing up in Mumbai. "I went to a very good school which did encourage us to work with children who lived in slums and on the street", she says. Her father died when she was a child and her mother, who was one of the only female corporate executives for a German company in Asia at the time, raised Chatterjee and her sister alone. "That itself was a great lesson. The message we got was that even though we lived in a patriarchal society, women could be very competent." She won a scholarship to Atlantic College in Wales and then to Harvard, where she graduated in history and science before taking a master's in health science at Johns Hopkins University. There was, however, never any doubt that her place was with the poor of India. "Already by the time I was 15 years old I was of the view that some of us had to come back and do something. It bothered me that some people like me had lots of opportunity and some did not."

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The art of medicine

Melancholy, medicine, and the arts

The black dog, the devil's bath, the mind's canker, the noonday demon—for centuries writers have tried to articulate the experience of sadness and its effect on the soul. While we now generally refer to such oppressive, persistent sadness as depression, for most of western European history this condition was known as melancholy. Like clinical depression, melancholy was understood to have a physiological basis, but debates concerning the condition often stretched beyond the world of medicine. In particular, philosophers, artists, and scholars speculated upon the perceived relation between melancholy and extraordinary achievement. In ancient Greece, a writer long thought to be either Aristotle or one of his followers noted the agony, hardship, and solitude that seemed always to plague the lives of the great. Citing the sorrows of mythical heroes, such as Hercules, Ajax, and Bellerophon, as well as historical figures like Plato and Socrates, he asked a question that would intrigue and trouble writers for many ages: "Why is it that all men who have become outstanding in philosophy, statesmanship, poetry, or the arts are melancholic?"

Wellcome Library, London

Melencolia I by Albrecht Dürer

Today we associate melancholy with longing and nostalgia, a semiconscious yearning for something perceived as lost. But nearly two and a half millennia ago, in the time of Aristotle, melancholy was understood as a specific physiological state arising from imbalances in the body's four humours. According to this theory, which would underwrite western medical knowledge and practice for the next 2000 years, the body was made up of blood, phlegm, yellow bile, and black bile, and fluctuations among these elements determined the health of both the body and the mind. Each humour was linked to a particular emotional temperament, and it was believed that those with a preponderance of black bile were inclined towards melancholy and despondency. For some such melancholic states were the temporary consequence of an occasional imbalance, whereas for others a natural, permanent constitution made them constantly subject to this sullen condition.

In the writings of Aristotle, alongside Hippocrates and Galen, a host of symptoms, largely unpleasant, often accompanied the condition of melancholy. Fits, frenzies, sores, stomach-aches, haemorrhoids, torpor, despondency, and fear—these were the pains a melancholic might expect to endure. According to the Aristotelian tradition, however, the condition was not without its consolations—men who were naturally inclined to melancholy often displayed a touch of brilliance that set them apart from the general public. When Renaissance scholars began retranslating and reinterpreting Greek philosophical and medical texts, this link between genius and melancholy found a special place in their work. Marsilio Ficino, a 15th-century Italian humanist, developed the connection, adding to it the astrologically based claim that all those born under Saturn, a planet commonly associated with the contemplative life, were prone to melancholic brilliance. This idea greatly influenced other Renaissance thinkers, and it was not long before artists like Albrect Dürer began examining the idea of melancholy in their work.

In his engraving, *Melencolia I*, Dürer explored the relation between melancholy, creativity, and knowledge, emphasising the frustration that inevitably accompanied exceptional talent and ambition. By choosing a quiet, sedentary woman as his focus, Dürer aligned himself with an artistic tradition developed by his medieval

predecessors, who often used the image of a spinster sleeping by her distaff to depict the slothful temperament. But by bestowing upon her a leafy crown and bulky wings, Dürer took his depiction of Melancholy in a new direction, highlighting her link with divine inspiration. As the engraving suggests, this possibility of achievement beyond the capacity of most people comes at a cost—Dürer's Melancholy is surrounded by tools and instruments designed to measure, map, and explain the secrets of science and nature, but they all lie disused or discarded. Her gaze focuses neither on her work, nor on the blazing star illuminating the patch of sky in the background. Weighed down by her ponderous frame and earthly trappings, Dürer's Melancholy remains firmly rooted in the mortal world, raising the question of whether this condition should be viewed as a gift or a curse.

English writers in the 16th and 17th centuries similarly explored the existential side of melancholy. Writing in the 1630s, dramatist John Ford claimed that "Melancholy is not, as you conceive, indisposition of body, but the mind's disease". This emphasis on the psychological experience of melancholy, somewhat separate from the physiological condition, proved very popular. Indeed, the most famous melancholy character in William Shakespeare's canon, Hamlet, explores his situation in philosophical rather than medical terms. The word "melancholy" itself appears only twice in the play, and references to humours or other medical concepts hardly at all. For all Hamlet's morbid talk of "self-slaughter", the "sterile promontory" that is the earth, and "this quintessence of dust" that is man, the courtiers swarming around him never characterise his condition as particularly pathological.

Although plays from the period might suggest that melancholy was increasingly distancing itself from the medical tradition, doctors' casebooks from the 16th and 17th centuries tell a different story. In the notes of John Hall, a country physician who was also Shakespeare's son-in-law, melancholic patients were regularly treated with strong purgatives, cordials, clysters, and bloodletting. Radishes might be applied to the feet to dispel noxious vapours, or leeches to the patient's "haemorrhoidal veins" in an effort to relieve the black bile medical writers thought accumulated in the viscera. Even into the 18th century, when melancholy was increasingly seen as a disease of the nerves, bloodletting and purgation remained popular therapies.

Still, many scholars have characterised the Renaissance as the "golden age of melancholy", a time in which questions regarding the condition's links to inspiration, frustration, and greatness abounded. Although debates about melancholy by no means disappeared during the 18th century—Samuel Johnson showed a particular interest in the topic, famously claiming that Robert Burton's *Anatomy of Melancholy* was the "the only book that ever took him out of bed two hours sooner than he wished to rise"—it was in the Romantic era that melancholy enjoyed its second dawn. During this period, artists and writers again glorified the experience of melancholy, weaving it into one of their central aesthetic concepts, that of the sublime. According to Romantic poets, the experience of pleasure was not diminished, but rather intensified, by the knowledge of sorrow. As Charles Baudelaire wrote, "I can barely conceive of a type of beauty in which there is no melancholy". In the eyes of the Romantics, beauty characterised by harmony, an ideal of Enlightenment culture, was no longer a sufficient artistic aim. Valuing feeling over reason, tension over balance, these writers indulged in melancholic fantasies, revelling in the insight they believed sorrow could bring. In his *Ode on Melancholy*, Keats described the condition as falling "Sudden from heaven like a weeping cloud", and he encouraged his readers to "taste the sadness of her might".

Literary glorification of melancholy persisted through the 19th century, but with the advent of Freudian theory attitudes towards and understandings of melancholy again shifted. In his essay, *Mourning and Melancholy*, Sigmund Freud described the condition as a narcissistic disorder resulting from the self's sense of loss. No longer a result of humoral pathology, astrological influence, or nervous disease, melancholy according to Freud arose from disjunction in self-identity that occurred as an individual progressed through different stages of life.

In the years after Freud, melancholy began to be seen as an increasingly rare condition, with diagnoses of depression finding favour among doctors instead. While many writers have sought to emphasise the distinctions between historical concepts of melancholy and contemporary understandings of depression—Susan Sontag famously wrote, "Depression is melancholy, minus its charms"—certain similarities cannot perhaps be denied. In the 20th century, psychiatric studies have attempted both to confirm and dispel the perceived connection between genius and madness, with mixed results. Although modern researchers such as Dean Keith Simonton have suggested "that creativity shares certain cognitive and dispositional traits with specific symptoms" of psychopathology, they have also stressed that it is unlikely that such traits are causally linked. Continuing interest in the life and work of troubled artists such as Sylvia Plath, as well as modern attempts to retrospectively diagnose figures like Vincent van Gogh, suggest that, in our own culture, beliefs in links between dejection and brilliance persist, and it seems likely that they will continue to do so for years to come.

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Bachrach

Julius Richmond

Paediatrician and former US Surgeon General. Born on Sept 26, 1916, in Chicago, IL, USA, he died of cancer on July 27, 2008, in Chestnut Hill, MA, USA, aged 91 years.

"In a democratic society we have responsibility to respect the dignity and to meet the needs of the individual even in his tender years", wrote Julius Richmond in a 1970 report on Project Head Start, a US government initiative to provide educational, health, and social services to disadvantaged preschool children and their families. Throughout his career as a paediatrician, then as director of Project Head Start and US Surgeon General, Richmond combined his research and clinical work with his interest in public-health policy to help disadvantaged children break the cycle of poverty.

Richmond's early research focused on the relationship between parents and infants to investigate how parents communicate their feelings to their children through caretaking and how this affects personality development and learning later in childhood, according to a report he wrote in 1970. This work led to his research on cognitive development in disadvantaged children. In 1964, Richmond and Betty Caldwell, his colleague at the State University of New York College of Medicine (SUNY) at Syracuse, NY, USA, implemented a programme of cognitive and emotional stimulation that they identified as being important to early cognitive development. Unable to separate infants from their mothers, the researchers studied children who were already in day care. This research showed the developmental benefits of the programme. "The key revelation was that it was possible to intervene and improve outcomes for disadvantaged children by supporting families and improving out-of-home care", says Lisbeth Schorr, Richmond's long-time collaborator and a lecturer in the department of social medicine at Harvard Medical School. "The idea that you could actually do something to change outcomes for these children was new."

US President Johnson's new director of the Office of Economic Opportunity (OEO), Sargent Shriver, followed Richmond's work and, in 1965, recruited him to implement Project Head Start. By mid-1965, the Project was helping half a million children in more than 2000 communities. "We're still fighting that battle—to invest very early in life. He led that battle", says Maureen Black, a professor of paediatrics at the University of Maryland School of Medicine. At the OEO, Richmond also helped to establish the Neighborhood Health Center programme that reformed the financing of health care and provided health services to the poor.

Richmond received his MD from the University of Illinois in 1939 and served as a flight surgeon with the US Air Force during World War II. He then returned to the University of Illinois and taught paediatrics. In 1953, he moved to SUNY where he did his pioneering work with Caldwell. After his time at the OEO, Richmond returned to SUNY in 1967 and became dean of the medical school. 4 years later he moved to Harvard Medical School, Boston, MA, where he was a professor in the departments of child psychiatry and human development and preventive and social medicine. He also served as chief of psychiatry at Boston's Children's Hospital.

Richmond returned to Washington, DC, in 1977 to serve as Surgeon General and Assistant Secretary for Health under President Jimmy Carter. In 1979, he wrote the first Surgeon General's *Report on Health Promotion and Disease Prevention*, a landmark report that outlined public health goals for the nation and emphasised prevention over treatment. That same year, he issued a report about the scientific evidence of the harmful effects of cigarette smoking. Throughout his career he was a fierce proponent of tobacco control, serving as an expert witness in two class-action lawsuits brought against the tobacco industry and supporting calls for a nationwide smoking cessation programme.

In 1981, Richmond returned to Harvard to teach health policy and direct Harvard's Division of Health Policy Research and Education. He received many awards, including the Heinz Award for Public Policy, the Walsh McDermott Medal of the Institute of Medicine, and the Excellence in Public Service Award from the American Academy of Pediatrics. The Richmond Center, an interdisciplinary research centre for child health and development at Harvard, is named after him. He is survived by his wife, Jean Berger Richmond, two sons, and two stepsons. His first wife, Rhee, predeceased him.

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Primary health care must go beyond WHO

We were pleased to hear Margaret Chan's strong commitment to primary health care 30 years after the Alma-Ata Declaration. In your Editorial on her statement (May 31, p 1811),[1] you mention that the challenge in revitalising primary health care lies in tying together the ever-increasing number of global initiatives.

However, there is more to it than this. To reappraise primary health care, we should go back to the basics, or the three pillars of primary health care: participation, intersectoral collaboration, and equity.[2] We have seen great progress in participation and equity. Participation has been strengthened in many communities and countries, as exemplified by the growth of the civil society movement. In terms of equity, "health for all" used to be the slogan for primary health care, and access has been the key to achieving it. The Global Fund and other initiatives have indeed improved access to bednets, antiretrovirals, and tuberculosis treatment, which has resulted in visible outcomes.

By contrast, we have seen little progress in intersectoral collaboration. When the UN set up the Millennium Development Goals, each goal was expected to have synergistic effects. However, in trying to achieve each goal more rapidly and more effectively, the leading health initiatives have instead taken selective approaches. Now the Global Fund and GAVI Alliance are trying to spend more funding on health systems. A diagonal approach is also recommended.[3]

However, intersectoral collaboration must go beyond health, it must go beyond WHO. To make a breakthrough in primary health care, we need more progress in intersectoral collaboration and in synchronising all three pillars of primary health care at a global level.

We declare that we have no conflict of interest.

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Iodine nutritional status in Tibet

The Comment by Sumei Li and colleagues (June 14, p 1980)[1] on iodine status in Tibet is alarming. More than 30 years after the Tibet Autonomous Region launched an ambitious programme to prevent iodine deficiency, the situation seems to have hardly changed, since today two-thirds of the Tibetan population reportedly have no access to iodised salt. Li and colleagues correctly describe Tibet as having "among the most severe iodine deficiency in the world", so one might wonder why so little has been achieved so far. The data presented by Li do not even mention the existence of endemic cretinism in Tibet, which, unlike goitre, is the hallmark of severe iodine deficiency. 10 years ago, we reported neurological cretinism in Tibet.[2]

Apparently, some Tibetan schoolchildren are fortunate enough to receive iodised salt while at school. However, we do not know what happens with children who do not attend school or with children born of severely iodine-deficient pregnant women. In fact, few data on iodine deficiency in Tibet have been published in peer-reviewed publications, and none of the studies published on iodine intake in China was done in Tibet.[3]

Elimination of severe iodine deficiency has been achieved in most developing countries because strong and long-term political commitment has prevailed over economic difficulties. Consequently, there seems no reason why an emergent economy like China cannot take the appropriate steps to eliminate severe iodine deficiency in Tibet.

We declare that we have no conflict of interest.

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Sumei Li and colleagues[1] provide an informative insight into the enormous challenge of eliminating iodine deficiency disorders in Tibet. Although their comments on the poor coverage with iodised salt in remote communities are accurate, we believe they portray a rather pessimistic view of the successful iodised oil supplementation programme.

From 2000 to 2004, working collaboratively with the Tibet Department of Health at the operational level, and with financial support from AusAID and WHO, we developed a Tibet region-wide supplementation programme aimed at providing sufficient iodine by administering one capsule of iodised oil annually to all women of childbearing age and children younger than 2 years. Implemented as an interim strategy, in the absence of an effective programme of iodised salt production and distribution, the iodised oil reached about 95% of the target population.[2] Urinary iodine excretion in these women increased on average from 39 μg/L to 96 μg/L.

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We estimate that 170 000 children born in Tibet since the programme commenced have been protected from brain damage. We are aware, however, that iodised oil coverage has declined recently because of lack of resources and we are attempting to find funding to restore the programme to the 2004 level.

We declare that we have no conflict of interest.

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Iodine deficiency in the UK and Ireland

Your timely Editorial (July 12, p 88)[1] indicates that salt iodisation ensures adequate iodine intake and that, reassuringly, household use of iodised salt has increased from 20% to 70% in developing countries. We are concerned that in two developed countries, the UK and Ireland, the consumption of iodised salt is probably less than 5%.

Although the Editorial states that "the number of households in the developing world that use iodised salt has risen", Europe still lags behind and the UK and Ireland languish at the bottom of the international league table in terms of iodised salt availability. We measured the iodine content in 36 different salt preparations obtained from nine major national supermarkets in Cardiff, Wales. The number of samples ranged from one to seven per retail outlet. Iodine concentrations varied from undetectable in 32 samples to trace quantities (0·005 mg/kg) in two. Another two samples, which were labelled as iodised salt, contained about 20 mg/kg iodine (one of these was German in origin, the other English). Thus only four of the 36 retail salt samples contained measurable concentrations of iodine, and only two of these contained meaningful concentrations related to the prevention of iodine deficiency.

Should this lack of iodised salt cause concern? Data from northeast England,[2] Wales,[3] and Scotland[4] suggest that not only is this intake not being achieved but that up to 50% of pregnant women could be significantly iodine deficient during gestation. A similar pattern of iodine deficiency has been seen in Ireland, with iodine intake being particularly low in the summer months.[5]

In view of the neurocognitive defects of gestational iodine deficiency noted in your leader, we suggest that the situation relating to iodine consumption, particularly in pregnancy, be systematically examined in both countries.

We are, respectively, the UK and Ireland representatives of the International Council for Control of Iodine Deficiency Disorders (ICCIDD). We declare that we have no conflict of interest.

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Voclosporin (ISA247) for plaque psoriasis

We have concerns with the trial of voclosporin (ISA247) for plaque psoriasis by K Papp and colleagues (April 19, p 1337).[1]

The use of placebo despite the existence of proven treatments is unethical and cannot be justified by the US Food and Drug Administration requirement of placebo-controlled studies.[2] Also, the rate of adverse effects in the placebo group (79%) requires discussion.

Lipid concentrations at the start of the trial are not stated. Did patients with high triglyceride concentrations receive the treatment required for an at-risk population? Were patients screened for changes in other lipid and non-lipid risk factors, considering that high serum triglycerides are associated with an increased risk of ischaemic heart disease and other risk factors?[3]

What proportion of patients received previous topical or no therapy for psoriasis? How were patients switched from previous oral therapy to voclosporin? The inclusion of patients who had previous oral or topical therapy for plaque psoriasis complicates the study.

47% of patients in the 0·4 mg/kg group responded to treatment compared with 4% of the placebo group. Chaidemenos and colleagues[4] showed that intermittent versus continuous 1-year ciclosporin use in chronic plaque psoriasis was associated with 92% versus 62%, respectively, of patients achieving a 75% improvement in psoriasis area and severity index score (p=0·008). One wonders how the efficacy of voclosporin would have compared to ciclosporin.

Finally, with a follow-up of only 24 weeks, the study was too short to determine effect and relapse rates.

We declare that we have no conflict of interest.

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Authors' reply

Use of a placebo in psoriasis trials is recommended by the European Medicines Agency to capture the seasonal variation of psoriasis.[1] For diseases with high near-term morbidity or mortality, ethical justification of a placebo group is unthinkable. Where no generally accepted, well tolerated, highly effective therapy is available, comparator studies verge on ethical tolerance. In an evidence-based environment, such as our trial, where efficacy and safety are demanded, placebo controls are ethically essential. All patients in this study received active treatment, with the placebo group switching to 0·3 mg/kg voclosporin (ISA247) twice daily at week 12.

Although the absolute number of adverse events in the placebo group was high (79%), all were very mild in nature. We did not feel that this warranted discussion because the types of events were clearly presented in table 4.

There were no differences in mean baseline concentrations of cholesterol or triglycerides between the groups (table). Since there was no difference, it was not reported. According to the US National Cholesterol Education Program, these baseline triglycerides were not high enough to require treatment.[2]

All patients enrolled in the study were free of systemic and topical treatment for 30 days before the start of the study. The number of patients who had received previous systemic therapy was equal among all groups and did not confound the analysis.

To compare the efficacy of voclosporin directly with that of ciclosporin, a blinded, phase III multicentre trial (NCT00408187) is in progress. The results of this trial will be available in 2009.

We feel that a 24-week study is sufficient to determine effect. However, this study was extended to 60 weeks of treatment, and a paper describing efficacy and relapse rate results of this long-term study is in preparation.

KAP has served as a consultant and advisory board member, scientific advisory board member, or scientific officer for Abbott, Alza, Amgen, Celgene, Centocor, Isotechnika, Janssen Ortho Biotech, Johnson & Johnson, Medimmune, MerckSerono, and Wyeth.

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	Placebo	Voclosporin 0·2 mg/kg	Voclosporin 0·3 mg/kg	Voclosporin 0·4 mg/kg
Cholesterol (mmol/L)	5·4 (1·00)	5·3 (1·07)	5·5 (1·19)	5·3 (1·08)
Triglycerides (mmol/L)	2·1 (1·24)	1·9 (1·09)	1·8 (1·07)	1·9 (1·20)

Table: **Mean (SD) baseline cholesterol and triglyceride concentrations in the four groups**

35 years of Japanese policy on rare diseases

In the June 14, 2008, issue of *The Lancet*, recent policies on rare diseases in western countries were reviewed.[1,2] In Japan, the National Programme on Rare and Intractable Diseases was launched in 1972. Since then, the government has promoted research and expanded support for patients with rare and intractable diseases.

Such diseases are defined as those with a prevalence in Japan of less than 50 000, or one in 2500, and with no known cause or cure. 123 diseases that fit the definition have been specified by an Expert Advisory Board on the basis of research priorities, and include Behçet disease, multiple sclerosis, and amyotrophic lateral sclerosis.

The programme has some unique characteristics. First, patients with one of 45 specified diseases (identified by the Board out of the 123 diseases on the basis of relatively severe consequences and high medical cost) can enrol in a registration system. Registered patients are eligible for a subsidy scheme, which covers inpatient and outpatient care as well as medications. This scheme has greatly improved patients' access to diagnosis, treatment, and care.

Second, government-funded research groups not only do research on the prevalence, diagnosis, and management of rare diseases, and on patients' quality of life, but also serve as a network to disseminate information on diagnosis and treatment throughout Japan. There are currently more than 60 research

groups working on the 123 rare and intractable diseases, each consisting of leading clinicians and researchers in Japan. Patients' samples obtained with informed consent are shared among members of the research groups for investigations including biochemical and genetic testing.

Third, although principal investigators and collaborating experts of each research group have changed over the 35 years, knowledge and expertise have been passed on to successive groups for continued research and development.

The government established the Japan Intractable Diseases Information Centre in 1997. This website, frequently visited by medical professionals, patients, and the public, provides general information on the 123 rare and intractable diseases, a list of experts in the research groups, research achievements, and contact addresses of patients' support organisations.

For the **Japan Intractable Diseases Information Center**, see http://www.nanbyou.or.jp/

Because there has been pressing demand to include more diseases in the programme, the Expert Advisory Board recently added seven more diseases to the list, totalling 130 specified diseases (as of June 23, 2008).

We declare that we have no conflict of interest.

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For the **Access to Medicine Index** see http://www.atmindex.org/

Rare diseases: a role for primary care

We were pleased to see *The Lancet* highlighting the issue of rare diseases (June 14, p 1978).[1] We also believe that rare diseases as a group are an important medical and social issue[2] and that patients' support groups will continue to have a major role in moving this agenda forward.[3] We were surprised, therefore, to see no mention of the role that primary care can or does have in the care of patients with rare diseases and their families.

We know that general practitioners see a lot of people with rare diseases.[4] General practitioners are well placed to provide patient-centred, holistic care that could mitigate some of the common problems experienced by those with a rare disease. We published an outline version of what good-quality primary care for rare diseases might look like.[5]

Primary-care services would not be neglected in planning strategies for chronic diseases, and nor should they be for rare diseases. Patients, families, and health systems have a lot to gain from their inclusion.

We declare that we have no conflict of interest.

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The new Access to Medicine Index

The Access to Medicine Foundation's new index set out to improve access to medicines through a transparent, quantifiable comparison of corporate social responsibility for 20 pharmaceutical companies. It has turned out as an attractive new business tool for big pharma. The index has taken a strictly business approach to measuring access to essential medicines, presenting data collected from the giant pharmaceutical companies while overlooking crucial information from end-users and local consumers (patients) in developing countries.

The core approach of the index, published by a foundation led by a former industry marketing consultant, assesses the pharmaceutical companies on a five-point scale according to criteria developed by a Dutch investment research consultancy. The weakness of the study lies in its "on-paper" approach to measuring the effectiveness of corporate social responsibility programmes. Moreover, the method leaves the results vulnerable to attack. The index is based on information made available by pharmaceutical companies and a few non-governmental organisations, with the largest input coming from surveys of the pharmaceutical industry itself.

Five multinational pharmaceutical companies take the top spots in the index, whereas generic manufacturers languish nearer the bottom of the list, despite doing more to improve access to essential medicines for the world's poor through lowering drug prices. This index might give a financial boost to the big brands and their socially conscious investors, but it cannot achieve its objective of real improvements in access to essential medicine in developing countries.

The aspiration to produce a quantifiable study of corporate social responsibility standards that promotes access to medicines is laudable. However, measuring access to essential medicines is best achieved by looking at both pharmaceutical policy and the view from the ground. Without accompanying data on the effectiveness of pharmaceutical corporate social responsibility policy, the value of the index is, at best, debatable. Having the rules is not the same as playing by the rules. What we need is a comprehensive analysis of industry performance on access to essential medicines that rewards

impact rather than rhetoric and promotes health outcomes rather than investment incentives.

I declare that I have no conflict of interest.

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In the same week that Pfizer won its legal right to ward off market entry for Ranbaxy's generic version of Lipitor (atorvastatin),[1] the Access to Medicine Index also received media interest.[2] This innovative index incorporates hitherto neglected criteria to rank pharmaceutical companies according to their efforts to improve global access to medicines. These criteria include the affordability and availability of a drug in low-income and middle-income countries; accessibility of generic medication; research and development of vaccines and drugs targeting illnesses found mainly in low-income and middle-income countries; and philanthropic donations. The transparency of the Access to Medicine Index holds promise in creating a public image incentive to promote corporate social responsibility.

Less developed countries have long faced difficulties of accessing essential pharmaceuticals.[3] Yet, issues of equity and access have evaded the public eye in high-income countries. However, with the escalating costs of market-driven health care and domestic disparities in access and delivery, wealthier nations are increasingly attending to corporate ethics.

The Human Development Index conceptually exemplifies how ranking indices might stimulate global consciousness. The Access to Medicine Index could motivate more effective and sustainable commitment because active pharmaceutical-sector involvement was sought, and because there are underlying monetary incentives at stake for an industry dependent on progressively better informed consumers.

The ramifications of legal proceedings akin to the Pfizer–Ranbaxy case affect availability of life-saving medication in low-income and middle-income countries, but also cost-containment strategies and quality of care in high-income countries. The Access to Medicine Index invokes parallels between efficiency and equity, wider implementation of proven treatments, and innovation to produce cheaper or more user-friendly (eg, combination) therapies. The burgeoning need for these therapies in populous developing countries should be viewed as consumer markets where low-cost, high-volume sales could be profitable.[4]

Incorporating novel strategies such as "out-licensing" can overcome patent barriers to treatment access in low-income and middle-income countries and ensure drug delivery to disadvantaged people that the medication is intended for, while protecting corporate profits in high-income countries where most large pharmaceutical company profits are made.[5]

In a globalising world, traditional static models of health care might need to give way to innovative, dynamic mergers between the values of profit-driven business and doing public good. Tools such as the Access to Medicine Index might be one way to stimulate cooperation between sectors that should not have mutually exclusive aims, edging health care back towards the social good that was intended.

We thank Reshma Roshania for her critical review and comments. We declare that we have no conflict of interest.

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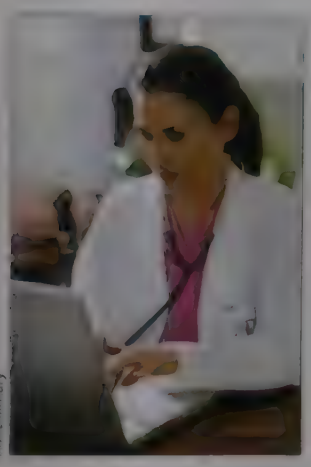
Registries and RCTs for new interventional procedures

Georgios Lyratzopoulos and colleagues from the Interventional Procedures Programme (May 24, p 1734)[1] highlight that lack of evidence creates challenges to the introduction of new interventional technologies. Registries have real benefits, but downplaying the role of randomised controlled trials is unacceptable. Registries are about audit of data as submitted, whereas trials are a response to uncertainty over best practice, with complete data being collected.

Registries provide pilot data for the size of randomised trials and document learning curves for new technologies, as in the Endovascular Aneurysm Repair (EVAR) trials in patients with abdominal aortic aneurysm.[2,3] Funding for these trials was conditional on randomisation and careful documentation, which enabled a protocol of fitness and anatomical suitability for the procedure to be followed. In EVAR 1, across the 41 centres, operative mortality was remarkable at 1·7% for EVAR and 4·7% for open repair.[3] A later trial in the Netherlands and Belgium, DREAM,[4] adopted a similar protocol with similar results. Auditing in a registry would not



have posed and answered these key questions. But after the trials, what next?

English hospitals reported more procedures for abdominal aortic aneurysm repair, with higher operative mortality (8·7%) than figures reported by the National Vascular Database (6·8%).[5] A national registry could easily be useless if practitioners submit only good results. Making the funding of devices conditional on entry to the national register is a start, but more is required. To emulate the excellent result from these trials, a similar learning curve, interdisciplinary working, and selection for procedure should be required as conditions of funding.

A national registry could indeed be a major asset once key questions are settled by randomised controlled trials. The link of mandatory registration and mandatory protocol within the register is the key to the achievement of best practice. Both randomised controlled trials and national registries are needed for new interventional procedures.

We declare that we have no conflict of interest.

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GOLD MARK: an anion gap mnemonic for the 21st century

A *Lancet* Editorial[1] in 1977, referring to an article entitled "Clinical use of the anion gap"[2] opined: "In an age when all too often plasma-electrolyte measurements are ordered without any deliberate judgment being made as to the likely usefulness of the result, it is refreshing to have a reminder of the subtleties involved in the interpretation of this commonest set of clinical-chemistry tests". We have discovered some new twists over the past 30 years and would like to share an easily remembered mnemonic aid.

The metabolic acidoses are generally separated into two categories on the basis of an anion gap calculation ($Na^+[Cl^-HCO_3^-]$): the high-anion-gap metabolic acidoses, and the normal-anion-gap, or hyperchloraemic, metabolic acidoses. Two popular mnemonics are often used to remember the major causes of the high-gap metabolic acidoses. The first is KUSMALE (a useful misspelling of Adolph Kussmaul's name), which represents Ketoacidosis, Uraemia, Salicylate poisoning, Methanol, Aldehyde (paraldehyde), Lactate, and Ethylene glycol. The second is MUD PILES, representing Methanol, Uraemia, Diabetes, Paraldehyde, Iron (and Isoniazid), Lactate, Ethylene glycol, and Salicylate.

Metabolic acidosis due to excessive paraldehyde use has become exceedingly rare. Iron and isoniazid are just two of many drugs and toxins that cause hypotension and lactic acidosis (isoniazid can also generate a component of ketoacidosis). Three "new" organic anion-gap-generating acids and acid precursors have been recognised in recent years. They are D-lactic acid, which can occur in some patients with short bowel syndromes; 5-oxoproline (or pyroglutamic acid) associated with chronic paracetamol use, often by malnourished women; and the anion-gap acidosis generated by high-dose propylene glycol infusions. Propylene glycol, the solvent used for several parenteral medications including lorazepam, phenobarbital, and others is metabolised to D-lactate and L-lactate.

Therefore we propose a new anion gap mnemonic for the 21st century: GOLD MARK. This acronym represents Glycols (ethylene and propylene), Oxoproline, L-lactate, D-lactate, Methanol, Aspirin, Renal failure, and Ketoacidosis. Mnemonic aids are only helpful if they are easily remembered and we believe GOLD MARK fits that requirement.

We declare that we have no conflict of interest.

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Implications of mortality transition for primary health care in rural South Africa: a population-based surveillance study

Stephen M Tollman, Kathleen Kahn, Benn Sartorius, Mark A Collinson, Samuel J Clark, Michel L Garenne

Summary

Background In southern Africa, a substantial health transition is underway, with the heavy burden of chronic infectious illness (HIV/AIDS and tuberculosis) paralleled by the growing threat of non-communicable diseases. We investigated the extent and nature of this health transition and considered the implications for primary health care.

Methods Health and sociodemographic surveillance started in the Agincourt subdistrict, rural South Africa, in 1992. In a population of 70 000, deaths (n=6153) were rigorously monitored with a validated verbal autopsy instrument to establish probable cause. We used age-standardised analyses to investigate the dynamics of the mortality transition by comparing the period 2002–05 with 1992–94.

Findings Mortality from chronic non-communicable disease ranked highest in adults aged 50 years and older in 1992–94 (41% of deaths [123/298]), whereas acute diarrhoea and malnutrition accounted for 37% of deaths (59/158) in children younger than 5 years. Since then, all-cause mortality increased substantially (risk ratio 1·87 [95% CI 1·73–2·03]; p<0·0001) because of a six-fold rise in deaths from infectious disease affecting most age and sex groups (5·98 [4·85–7·38]; p<0·0001), and a modest increase in deaths from non-communicable disease (1·15 [0·99–1·33]; p=0·066). The change in female risk of death from HIV and tuberculosis (15·06 [8·88–27·76]; p<0·0001) was almost double that of the change in male risk (8·13 [5·55–12·36]; p<0·0001). The burden of disorders requiring chronic care increased disproportionately compared with that requiring acute care (2·63 [2·30–3·01]; p<0·0001 *vs* 1·31 [1·12–1·55]; p=0·0003).

Interpretation Mortality from non-communicable disease remains prominent despite the sustained increase in deaths from chronic infectious disease. The implications for primary health-care systems are substantial, with integrated chronic care based on scaled-up delivery of antiretroviral therapy needed to address this expanding burden.

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See Editorial page 863

See Comment page 866

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Introduction

The heavy burden and public awareness of HIV/AIDS, tuberculosis, and malaria in sub-Saharan Africa should not obscure recognition of the substantial health transition that is underway, and the implications of this transition for the delivery of effective primary health care. Moreover, as availability and coverage of highly active antiretroviral therapy (HAART) extends and takes effect, with ensuing improvements in life expectancy, the constraint exerted on cardiovascular and other chronic non-communicable diseases will be loosened, leading to a probable upswing in mortality, morbidity, and risk related to such diseases.

Primary health-care systems have mainly evolved in a pre-transitional era and have adapted little to the growing demand for continuous, long-term care. However, to respond effectively to personal and community needs, and to enhance the effect of services, primary health-care systems should develop an approach to the management of chronic diseases. The imperative of HIV/AIDS, and particularly the urgent need to deliver HAART, is driving the development of health systems in large parts of sub-Saharan Africa. Therefore the opportunity exists to harness this effort and ensure that it is applied to management of both chronic infectious and non-communicable diseases. Up until now, however, public-sector systems supporting primary health care have not been regarded as the approach of choice for management of HIV/AIDS and related illness. Instead, funders and programme leaders have opted to establish new, dedicated programmes rather than invest in strengthening the existing comprehensive but generally weak delivery platforms that are common to the public-health sector.

Influenced by the ideals of the Alma-Ata Declaration,[1] the new South African Government in 1994 articulated a policy of district health development that centred on primary health care. This idea remains national policy, with President Mbeki using his State of the Nation address to emphasise "accelerating our advance towards the achievement of the goal of health for all".[2] Although the envisaged health gains have not materialised,[3] the country could yet turn a corner.

With comprehensive cause-specific mortality data from a border region of rural southern Africa from 1992 to 2005, supplemented by available morbidity and risk data, we aimed to investigate the extent and nature of the

health transition that is underway and to consider the implications for primary health care.

Methods

Study setting and population

The Agincourt subdistrict includes about 70 000 people in 11 500 households and 21 villages. It covers 402 km² in rural northeast South Africa, adjacent to its border with Mozambique. The Agincourt population has been under continuous health and sociodemographic surveillance by the MRC/Wits Rural Public Health and Health Transitions Research Unit since 1992. This surveillance preceded the advent of democracy, was introduced to inform policy about decentralised health systems development, covers the first decade of profound sociopolitical change, and documents the accelerating effect of the HIV/AIDS epidemic. Migration after the Mozambican civil war led to immigrants comprising almost a third of the population.

Similar to much of rural southern Africa, the Agincourt subdistrict is a labour-sending area, with most adults seeking work in industrial, mining, or agricultural centres elsewhere, and offers limited local employment and farming opportunity. Household income comes from migrant remittances and employment in the public sector, and through tourism. In South Africa, social transfers (pensions and child-support grants) have a crucial role in redistribution of income to poor households. Migrant labour is a constant feature, involving some 60% of men aged 30–54 years and a quarter of women aged 25–49 years.[4] The area has poor infrastructure despite improvement to electricity and water supply. Health facilities include a health centre with five satellite clinics and three district hospitals that are 25–60 km away from Agincourt.

Demographic transition has been shown by a sustained decrease in fertility since the mid-1970s which, most unusually, has stabilised at near replacement level with little recent change in population size.[5] Decreases in mortality were sustained until the mid-1990s when the HIV/AIDS epidemic took off, inducing a major reversal in mortality in young adults and children younger than 5 years.[6] By 2005, life expectancy at birth had fallen by 12 years for women and by 14 years for men.[7]

Data collection

Health and sociodemographic surveillance included registration of the entire subdistrict population through a baseline census in 1992, and subsequent prospective follow-up through yearly updates that systematically recorded basic demographic events (births, deaths, and migrations).[8] Household interviews were undertaken by experienced fieldworkers who interviewed the most knowledgeable adult available, verified existing data, and carefully recorded new events. Data were entered onsite, had many validity checks, and were stored and manipulated in a secure relational database. Quality assurance included field and data checks to ensure robust numerator and denominator data for the calculation of rates.

For every death, a probable cause was established through a verbal autopsy that was undertaken by lay fieldworkers.[8] The fieldworker gathered information from a close caregiver about signs and symptoms of the terminal illness, lifestyle behaviours, and treatment sought. Cause of death was established through physician assessment of the verbal autopsy, and all diagnoses were coded according to the International Classification of Diseases (ICD-10). When two physicians working independently reached the same diagnosis, this was accepted as the probable cause of death. When their assessments differed and agreement could not be reached, a third physician arbitrated to achieve consensus. This method was validated in Agincourt in the mid-1990s.[9] After revalidation to assess the validity of HIV/AIDS diagnoses, HIV/AIDS and tuberculosis were combined, resulting in sensitivity and specificity approaching 80% for the one category. HIV/AIDS and tuberculosis share similar signs and symptoms, resulting in misclassification when attempting to distinguish the two on verbal autopsy. Both diseases commonly co-exist, especially in younger adults, justifying their combination into one HIV and tuberculosis category.

With expert guidance from physician-researchers experienced in the clinical management of children and adults, we classified every death as requiring either acute or chronic care. Acute disorders were defined as potentially curable with up to 1 month of appropriate treatment, and chronic disorders as either incurable or requiring more than 1 month of treatment. We assigned an undetermined cause of death to a category of unknown care.

All surveillance-based studies were reviewed and approved by the Committee for Research on Human Subjects (Medical) of the University of the Witwatersrand, Johannesburg, South Africa (protocol M960720). Informed consent was obtained at individual and household level at every follow-up visit, whereas community consent from civic and traditional leadership was secured at the start of surveillance and reaffirmed from time to time.

Statistical analysis

We calculated period (1992–94, 1995–97, 1998–2001, and 2002–05), sex-specific, age-specific, all-cause, and cause-specific mortality rates by dividing deaths by person-years exposed within each category. Mortality rates by health-care category (acute or chronic) were calculated in the same way. We calculated age-standardised crude death rates using the standard age structure from the International Network for the Demographic Evaluation of Populations and Their Health (INDEPTH), which is a standard appropriate for sub-Saharan Africa.[10] The top five causes of death by period and age were

For more about the **International Network for the Demographic Evaluation of Populations and Their Health (INDEPTH)** see http://www.indepth-network.org

identified as percentages of total deaths within each category. We used Microsoft SQL Server 2005 for data management and extraction, and did all analyses with Stata (Intercooled version 9.0 and SE 10.0) and Microsoft Excel.

Role of the funding source

The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Table 1 presents age-standardised death rates for four periods from 1992 to 2005, showing that mortality rates have increased substantially since the mid-1990s. All rate ratios indicate change in the most recent period (2002–05) relative to the base period (1992–94). All-cause mortality increased by 87% over the whole period, largely because of a six-fold rise in infectious and parasitic disease and a modest increase in non-communicable disease (table 1). The increase in infectious and parasitic disease mortality was significant in all age and sex groups apart from children aged 5–14 years (for whom the change in HIV and tuberculosis mortality was significant; p=0·012) and adults 65 years and older (data not shown). The increase in mortality from non-communicable disease was significant for males (rate ratio 1·32 [95% CI 1·08–1·60]; p=0·006) but showed little change for females (1·02 [0·82–1·60]; p=0·85). Age-specific mortality from non-communicable disease increased significantly in adults who were 30 years and older (1·22 [1·02–1·46]; p=0·026); the change in younger age-groups was not significant. By contrast, external causes remained constant at a fairly high level of mortality (table 1). Undetermined causes increased significantly, partly because of the emergence of HIV/AIDS which can be difficult to assess by verbal autopsy.

With respect to increased infectious and parasitic disease mortality, the change was driven by HIV and tuberculosis (rate ratio 10·75 [7·89–14·63]; p<0·0001), with the change in female risk of death (15·06 [8·88–27·76]; p<0·0001) almost double the change in male risk (8·13 [5·55–12·36]; p<0·0001). Other infectious diseases that significantly increased mortality rates included acute respiratory infections, which were probably affected by co-morbidity with HIV/AIDS, and malaria, which was possibly affected by inadequate control measures in neighbouring countries.[11] With respect to non-communicable disease, change was less evident because of the overwhelming effect of HIV and tuberculosis. Age-standardised rates for deaths due to diabetes increased significantly, although numbers were small (2·57 [1·20–6·32]; p=0·008); this finding was also true for the conditions grouped into the category termed other non-communicable diseases (1·50 [1·01–2·28]; p=0·038). In adults aged 65 years and older, deaths due to vascular disease (stroke, ischaemic heart disease, and hypertensive diseases) increased by 65% (1·65 [0·99–2·76]; p=0·056) and deaths due to malignant neoplasms (excluding female genital malignancies) more than doubled (2·20 [1·04–4·66]; p=0·040).

Table 2 ranks the five most common causes of death from 1992 to 2005. The early 1990s were characterised by diseases of poverty in children (acute diarrhoea and malnutrition made up nearly 40% of deaths), accidents and violence in those aged 15–49 years, and non-communicable disease in middle-aged and older adults (aged ≥50 years). The mid-1990s was the turning point: over the ensuing decade, mortality from HIV and tuberculosis increased from little over 10% to a third of all deaths in children younger than 5 years; from a fifth to almost half of deaths in those aged 15–49 years; and from a sixth to more than a quarter of deaths in people aged 50–64 years (table 2). In people aged 15–49 years, violent and accidental deaths were displaced by HIV and tuberculosis as the top ranking cause by the mid-1990s, but remained in second and third place over the remaining years (table 2). In women aged 15–49 years, obstetric deaths ranked first in the early period but not subsequently (data not shown). In adults aged 50–64 years, non-communicable disease took the top five places in the early 1990s, with vascular disease ranked first. By the mid-1990s, HIV and tuberculosis were ranked first, followed by vascular and other cardiac disorders (table 2). Non-communicable disease and tuberculosis dominated in the oldest age group throughout, with vascular disease constituting the largest proportion of deaths from the mid-1990s; by the late

	Years				Relative change	
	1992–94	1995–97	1998–2001	2002–05	RR (95% CI)	p value
Broad cause categories						
All causes	593	604	737	1111	1·87 (1·73–2·03)	<0·0001
Infectious and parasitic diseases	74	147	255	446	5·98 (4·85–7·38)	<0·0001
Non-communicable diseases	197	158	187	227	1·15 (0·99–1·33)	0·066
External causes*	76	63	61	72	0·95 (0·74–1·21)	0·673
Ill defined or unknown	198	178	115	237	1·19 (1·03–1·38)	0·019
Broad health-care categories						
All health care	593	604	737	1111	1·87 (1·73–2·03)	<0·0001
Acute care†	162	148	192	212	1·31 (1·12–1·55)	0·0003
Chronic care‡	209	230	330	550	2·63 (2·30–3·01)	<0·0001
Ill defined/unknown care§	222	225	215	348	1·57 (1·37–1·80)	<0·0001

All rates are per 100 000 person years (N=6153). RR=rate ratio. All rate ratios indicate change in last time period (2002–05) relative to first period (1992–94). *External causes include homicide, suicide, road traffic accidents, accidental injuries. †Acute care: for disorders that are potentially curable with up to 1 month of appropriate treatment. ‡Chronic care: for disorders that are incurable or need more than 1 month of appropriate treatment. §Difficult to classify as acute or chronic care.

Table 1: **Age-standardised death rates for broad cause categories and broad health-care categories in Agincourt subdistrict, 1992–2005**

	1992–94		1995–97		1998–2001		2002–05	
0–4 years of age								
Total		158		140		336		417
1	Diarrhoea	31 (20%)	Diarrhoea	33 (24%)	HIV/tuberculosis	73 (22%)	HIV/tuberculosis	141 (34%)
2	Malnutrition	28 (18%)	HIV/tuberculosis	16 (11%)	Diarrhoea	39 (12%)	Diarrhoea	43 (10%)
3	Perinatal disorders	12 (8%)	Acute respiratory infection	11 (8%)	Acute respiratory infection	34 (10%)	Acute respiratory infection	32 (8%)
4	Accidental injuries	9 (6%)	Malnutrition	9 (6%)	Perinatal disorders	30 (9%)	Malnutrition	32 (8%)
5	Other infectious and parasitic diseases	8 (5%)	Accidental injuries	6 (4%)	Malnutrition	26 (8%)	Perinatal disorders	23 (6%)
5–14 years of age								
Total		28		37		50		75
1	Other NCDs*	7 (25%)	Malaria	4 (11%)	Accidental injuries	12 (24%)	Accidental injuries	11 (15%)
2	Road traffic accidents	4 (14%)	Other NCDs*	3 (8%)	Malaria	6 (12%)	HIV/tuberculosis	11 (15%)
3	Epilepsy	3 (11%)	Accidental injuries	3 (8%)	HIV/tuberculosis	5 (10%)	Road traffic accidents	9 (12%)
4	Congenital	3 (11%)	HIV/tuberculosis	3 (8%)	Suicide	5 (10%)	Other NCDs*	5 (7%)
5	Accidental injuries	3 (11%)	Road traffic accidents	2 (5%)	Road traffic accidents	3 (6%)	Other infectious and parasitic	4 (5%)
15–49 years of age								
Total		159		251		609		1352
1	Assault	27 (17%)	HIV/tuberculosis	53 (21%)	HIV/tuberculosis	252 (41%)	HIV/tuberculosis	651 (48%)
2	Road traffic accident	14 (9%)	Assault	25 (10%)	Assault	32 (5%)	Assault	37 (3%)
3	HIV/tuberculosis	13 (8%)	Road traffic accident	22 (9%)	Road traffic accident	32 (5%)	Road traffic accident	35 (3%)
4	Other cardiac disorders†	10 (6%)	Other NCDs*	12 (5%)	Other NCDs*	28 (5%)	Malaria	29 (2%)
5	Neoplasms‡	9 (6%)	Neoplasms‡	11 (4%)	Malaria	24 (4%)	Other NCDs*	27 (2%)
50–64 years of age								
Total		105		154		217		453
1	Vascular disease§	20 (19%)	HIV/tuberculosis	24 (16%)	HIV/tuberculosis	38 (18%)	HIV/tuberculosis	126 (28%)
2	Chronic liver disease¶	8 (8%)	Vascular disease§	10 (6%)	Vascular disease§	26 (12%)	Vascular disease§	31 (7%)
3	Other cardiac disorders†	7 (7%)	Other cardiac disorders†	10 (6%)	Other NCDs*	10 (5%)	Other cardiac disorders†	31 (7%)
4	Other NCDs*	7 (7%)	Other NCDs*	10 (6%)	Neoplasms‡	10 (5%)	Other NCDs*	26 (6%)
5	Neoplasms‡	6 (6%)	Assault	9 (6%)	Female genital neoplasms	10 (5%)	Neoplasms‡	22 (5%)
≥65 years of age								
Total		193		355		479		578
1	Other cardiac disorders†	30 (16%)	Vascular disease§	39 (11%)	Vascular disease§	62 (13%)	Vascular disease§	76 (13%)
2	Vascular disease§	18 (9%)	Other cardiac disorders†	33 (9%)	Neoplasms‡	49 (10%)	Other cardiac disorders†	58 (10%)
3	Tuberculosis‖	15 (8%)	Tuberculosis‖	24 (7%)	Other cardiac disorders†	38 (8%)	Neoplasms‡	54 (9%)
4	Neoplasms‡	8 (4%)	Neoplasms‡	20 (6%)	Tuberculosis‖	31 (6%)	Tuberculosis‖	28 (5%)
5	Chronic liver disease¶	5 (3%)	Diarrhoea	18 (5%)	Other NCDs*	29 (6%)	Other NCDs*	26 (4%)

NCD=non-communicable diseases. *Includes disorders omitted from other categories such as anaemia, dementia, chronic obstructive pulmonary disease, asthma, peptic ulcer disease, etc. †All circulatory system diseases excluding hypertensive disease, ischaemic heart disease, and cerebrovascular disease. ‡All malignant neoplasms excluding those of female genital organs. §Cerebrovascular disease, ischaemic heart disease, and hypertensive disease. ¶Excludes all infectious causes. ‖The combined HIV/tuberculosis category was not used in the oldest age group because of the virtual absence of HIV/AIDS deaths.

Table 2: **Five most common causes of death by age and time period in Agincourt subdistrict, 1992–2005**

1990s, non-communicable diseases had displaced tuberculosis from third to fourth place (table 2). Although numbers are small in the 5–14 year age-group, accidents remained most common overall, although we noted a growing number of deaths from HIV and tuberculosis (table 2).

We also classified diseases according to the type of patient care that they required (acute or chronic). Mortality rates in each care category increased over time, indicating an overall increasing care burden on the health system (table 1 and the figure). Notably, the burden of disorders requiring chronic care increased disproportionately relative to the burden requiring acute care (table 1 and the figure).

Discussion

Changes in mortality patterns provide insight into the evolving course of health transition in South Africa. In all but the oldest age group, HIV and tuberculosis has had an overwhelming effect, supressing deaths due to acute infection and malnutrition in children, injury in people aged 15–49 years, and non-communicable disease in adults aged 50–64 years. However, non-communicable diseases had already emerged as prominent causes of death in middle-aged adults during the pre-HIV era (table 2). Despite the rise in mortality due to HIV and tuberculosis, and related infectious disease, mortality from non-communicable disease remains evident,

particularly in males for whom the relative increase in HIV and tuberculosis mortality, although substantial, was much less than that for females. Significantly rising mortality is not limited to younger age groups, but is pronounced in adults aged 40–59 years and even older.[12] Thus, were it not for HIV and tuberculosis, we suggest that mortality from non-communicable disease would be higher.

Because census updates occur only once a year in the Agincourt subdistrict, a small number of events might have been missed—eg, when a death occurs soon after birth and then both are not reported by the household respondent. This limitation could result in slightly lowered estimates of infant mortality, although the problem affects a very small proportion of births and would not affect our findings or conclusions.

Complementary research in Agincourt has focused on stroke morbidity and cardiovascular risk. Thorogood and colleagues' findings in 2003 from the Agincourt subdistrict showed substantial prevalence of hypertension in men and women (more than a quarter of adults aged 35–49 years and more than two-fifths of all adults 35 years and older); pronounced obesity in women (mean body-mass index of 27·2 kg/m² in women 35 years and older); more frequent cigarette smoking in men than in women; and modest cholesterol and high HDL-cholesterol concentrations compared with typical high-income populations (webtable).[13] This risk factor profile is reflected in vascular disease morbidity. The prevalence of stroke in Agincourt in 2001 was about half that typically recorded in high-income regions of the world, with an age-standardised prevalence of 290 (95% CI 238–343) per 100 000 people aged 15 years and older, but double that noted elsewhere in Africa.[14] Stroke prevalence increased with age, as it did elsewhere. Age-specific prevalence was similar in adults aged 45–54 years (598 per 100 000) to that recorded in New Zealand (615 per 100 000), but was lower in other age groups.[14,15] These data accord with an anticipated increase in vascular non-communicable disease in younger age groups during transition. Despite fairly favourable cholesterol concentrations, there is evidence of subclinical peripheral atheroma in the study population, and adults 35 years and older had a distribution of the ankle brachial index which was similar to that noted in high-income populations with peripheral vascular disease.[16] Although sub-Saharan Africa is usually cited as a region in the earliest stage of epidemiological transition,[17] this risk and morbidity profile suggests a population in a later stage of transition, one that is typically dominated by hypertension-related disease. Moreover, there is potential for the rural Agincourt population to advance yet further to a stage which is typified by the emergence of ischaemic heart disease, as has already occurred in people from urban South Africa.[18]

Agincourt is one of 37 sites in the developing world that make up the INDEPTH network and undertake prospective monitoring of populations living in defined

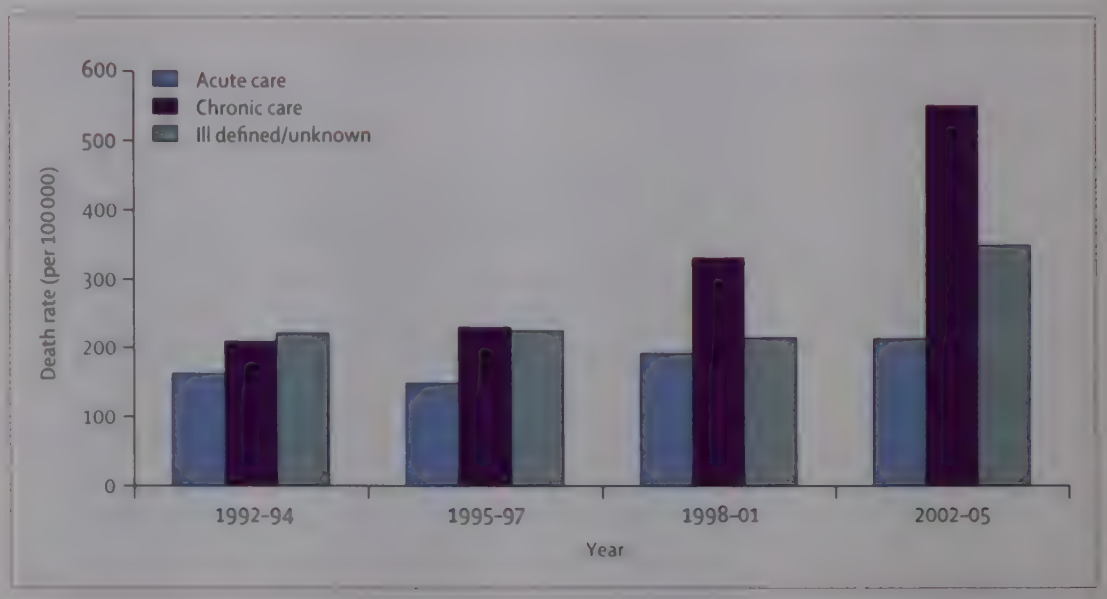

Figure: **Age-standardised death rates by health-care categories in Agincourt subdistrict, 1992–2005**

geographic areas. A comparison of mortality profiles from surveillance sites during 1999–2003 showed that malaria-related mortality was highest in west African sites, with AIDS-related mortality highest in South Africa. Nevertheless, all regions showed emerging cardiovascular mortality, with malignant neoplasms, diabetes, and digestive disorders also being important.[19] Findings from sites in urban settings such as Dar-es-Salaam (Tanzania),[20] Nairobi (Kenya), and Bissau (Guinea-Bissau) reinforce this emerging trend (unpublished data).

Growing evidence draws attention to the prevalence of hypertension in rural and urban locales across the continent.[21–23] This finding affirms the conclusion that rising blood pressure levels, increasing stroke prevalence and associated mortality,[20,24,25] and emerging ischaemic heart disease[26] are indicators of African communities that are already advancing through early stages of cardiovascular transition.[17]

Projections forecast that in sub-Saharan Africa, despite the excess mortality due to AIDS, the number of people aged 60 years and older will double from 34 million in 2005 to more than 67 million in 2030—a rate of growth which is greater than that in industrialised countries.[28] Older adults contend with an extremely stressful reality: high morbidity and mortality from HIV/AIDS leaves them responsible for the care of their own sick children and for the wellbeing of their grandchildren. They themselves, however, are at risk not only for HIV/AIDS but also for stroke, diabetes, hypertension, and related chronic disorders (table 2). The health transition is thus directly and indirectly affecting three generations, with the oldest of these, who have an irreplaceable social role, clearly vulnerable to chronic non-communicable diseases.

For local health systems development, national and especially subnational data are essential. The Agincourt data series conveys robust information that is well suited to consideration of the challenges facing primary health-care systems. Evidence suggests that, in the same community and to a substantial degree, chronic infectious

Panel: Management of chronic non-communicable disease in Agincourt

As in much of southern Africa, subdistrict services are based on a network of clinics that are staffed by primary-care nurses; support is inadequate, drug supply irregular, and medical supervision sporadic. Recent work examining the management of stroke, blood pressure, and tuberculosis described a major gap in the capacity to manage chronic illness.

Of 103 confirmed stroke survivors, only one was taking aspirin; of 85 with evidence of hypertension, eight were being treated but only one was adequately controlled. Thus no system of secondary prevention seemed to be in operation.[24]

In a survey of adults aged 35 years and older, 43% showed some degree of hypertension; 24% of these patients had used drug treatment in the past week, half of whom had a blood pressure reading less than 140/90 mm Hg, indicating the limits of primary prevention.[33]

Although hospital management of pulmonary tuberculosis was effective, most patients with active disease that was missed, or those who died before receiving treatment, had presented to a local clinic.[33] Some two-thirds of patients, already seen at a clinic, presented to hospital after self-referral or at the insistence of family, friends, or employers, leading to delays in start of treatment.[34] Care-seeking was pluralistic, involving allopathic, traditional, and faith-based healers; notably, however, most first visits were to local clinics, underlining their pivotal role.[34,35]

illness and chronic non-communicable disease coexist; moreover, that the explosive progression of HIV/AIDS mortality has slowed an already advancing transition in non-communicable disease. However, scaled-up efforts at HAART delivery, and the resulting population effect, can be expected to decrease adult mortality and raise life expectancy.[29] Thus, levels of non-communicable disease and risk should rebound in parallel with growing numbers of people who are receiving long-term antiretroviral therapy. Already, however, prevailing mortality patterns—documented in Tanzania at an earlier stage of transition[30,31]—suggest an escalating need for chronic-care services that cut across conventional categories of infectious and non-communicable disease.

Public-health leadership is thus at a crossroads. Failure to grasp the changes underway and adjust the prevailing model of care—which was born in a pre-transitional era and focused on acute, episodic infectious disease management[31,32]—will probably lead to a deteriorating relation between community needs and services provided. And it will be accompanied by progressively demotivated staff, loss of confidence by users, and little effect on population health. The problem is shown by consideration of chronic-disease management in Agincourt (panel).

Placement of integrated chronic care at the centre of primary health-care systems will ensure a comprehensive response to one of the most important health problems confronting local communities. In view of overriding concern with HIV/AIDS in sub-Saharan Africa, major impetus for chronic systems development should derive from efforts to accelerate the delivery of HAART, particularly through decentralising delivery to local level. Further, integration of HAART (and the full package of chronic infectious disease management) within general chronic care could well reduce stigma and enhance access and use.[36] But it will need a different outlook from service leadership and their funders—ie, one that recognises the fundamental compatibility between enhanced HIV/AIDS management and the strengthening of health systems. If scaled-up delivery of HAART can provide the means and opportunity to re-engineer primary health-care systems in an integrated way, rather than foster their further fragmentation, this approach will provide a basis to fully exploit the strengths of primary health care, many of which are still unrealised.

The primary health-care system spans a crucial interface between first-line clinical care, which is generally provided by mid-level health workers, and community-based prevention and promotion, involving a range of community workers, local organisations, and households. It is this level of care that holds much promise for health development in resource-poor settings. Yet for much of sub-Saharan Africa, health-system performance has fallen far below expectations.[37] How then could added complexity, in the form of integrated chronic care, invigorate primary health care?

Arguably, the complexity of establishing effective primary health-care systems has never been properly acknowledged. As a result, the sustained skill and creativity of national planners and the research community have been applied elsewhere. Further, individual recognition and promotion within the public service is generally associated with movement away from local and district levels and into provincial or national offices. These deficits, and not only international funding for single-purpose initiatives, have contributed to the proliferation of vertical programmes that have divided the integrated platform which is needed for effective community-level care. A clearer, more realistic perspective on the challenges presented by primary health care, and the policy, planning, and programming expertise required, could revitalise the research and development efforts that are needed to bring success.

Potential for widespread decentralised provision of HAART is high, and the evidence and experience now exist to support it.[29,38,39] Certainly this is the case in South Africa, where growing numbers of community health centres are belatedly being accredited to deliver comprehensive care, the government has increased available resources, and political support is more overt. The requirements for effective, decentralised provision

	HAART	Chronic NCD care
Primary care facility		
Clinic management	Continuity and coordination	As for HAART
Quality assurance	Continuity and coordination	As for HAART
Clinic infrastructure	Specialised space within general service for counselling, treatment literacy, data capture	As for HAART
Support services	Laboratory; drug supply	As for HAART
Health worker skills and attitudes: training and mentoring; promote morale and motivation	Extend and diversify health-care team: eg, clinical assistants, lay health workers and counsellors, pharmacy and laboratory assistants, data typist	As for HAART
Patient-centred care and support	Decision support; self-management support; patient support groups	As for HAART
Screening	Voluntary counselling and testing; tuberculosis	Blood pressure, blood glucose, lipids, etc
Standard treatment protocols	For HAART, PMTCT, opportunistic infections, tuberculosis	For diabetes, blood pressure, epilepsy, cardiac failure
Interface: facility and community		
Patient adherence: counselling; peer education	Promote patient adherence to reduce risk of drug resistance	Encourage treatment compliance to improve individual outcomes
Prevention and promotion programmes: community awareness/mobilisation; involvement of other sectors	Address issues of stigma	Intervene across disease continuum
Referral systems: community–clinic–hospital	Transport; communication	As for HAART
Community		
Community-based care and support	Community health workers support home-based care; complementary providers: traditional and faith healers; support groups: church-based, revolving funds, income-generating	As for HAART
Primary health-care system		
Monitoring and evaluation	Treatment cohorts; programme coverage and effectiveness	As for HAART

HAART=highly active antiretroviral therapy. NCD=non-communicable disease. PMTCT=prevention of mother-to-child transmission.

Table 3: **Key elements of primary health care in practice—integration of HAART and chronic non-communicable disease care**

of HAART, and those needed for competent local management of chronic non-communicable diseases, are closely aligned (table 3). Thus the effort, services, and resources which are directed at people and communities infected and affected by HIV/AIDS can be harnessed to fundamentally strengthen a crucial delivery platform for the range of chronic disorders. Doing so would greatly enhance the technical efficiency of key elements of the general primary health-care system, and realise the diagonal—"a strategy in which explicit intervention priorities are used to drive the necessary improvements into the health system".[40]

WHO has given serious attention to formulating and testing frameworks for chronic care systems,[32,41,42] and to the skill-set that is required of multipurpose health workers to support long-term patient-centred care.[31] WHO staff repeatedly note that an incremental approach is unlikely to succeed; rather, that a concerted shift, amounting to the redesign of delivery systems, is needed to achieve meaningful change. The challenge in adapting normative frameworks to underperforming systems in sub-Saharan Africa should not be underestimated. The gains from integration of care for chronic infectious and non-communicable diseases—in terms of service efficiency, quality and acceptability to users, and the effects on health status—will need to be shown. Thus a serious research and development agenda is needed that addresses which aspects of service integration are likely to be effective, how best to introduce them, and ensuring that assessment is based on rigorous study designs (including controlled trials of such complex interventions, the costs incurred, and probable sustainability). Results from earlier efforts to integrate reproductive health services are mixed, although recent evidence on the benefits of integrating primary child-care services is encouraging.[43]

Thorough understanding of the dynamics of health transition is important to achieve a serious appraisal of primary health-care systems in southern Africa and further afield. We conclude that a new approach to primary health-care systems is needed, with management of chronic disorders a key element. Central to health-system performance are leadership and staff competence. Service leaders at primary-care level will need to develop innovative responses to the demanding realities that they face. A range of less-practised skills—addressing personal behaviour and the influence of peer-groups, partnerships with community groups, service monitoring and assessment, and alliance formation across health and development sectors—will need emphasis to ensure that adequate levels of service coverage and treatment adherence result. Given high levels of labour migration in the region, and the many ill migrants who return to their rural homes for social support and medical care,[12] continuity of care will depend on effective communication of treatment histories between urban clinics and rural services. Chronic illness can impose heavy social and

monetary costs on poor households.[44] The imperative, therefore, to develop quality primary health-care systems, which are able to address effectively the rapidly expanding burden of chronic illness, could not be greater.

Contributors

SMT conceptualised the paper. SMT and KK wrote the paper, directed analyses, and interpreted results. MLG and SJC led mortality analyses, and BS ensured a clean dataset and undertook detailed statistical analysis. SMT directs the MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt), including its health and sociodemographic surveillance system (HDSS). KK leads the Agincourt mortality studies. MAC has responsibility for the Agincourt HDSS and database and oversees yearly updates. All authors contributed to the report, and read and approved the final draft.

Conflict of interest statement

ST served as Chair of the INDEPTH Board of Trustees 2002–06. All other authors declare that they have no conflict of interest.

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Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster-randomised controlled trial

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See **Editorial** page 863

See **Comment** page 868

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Summary

Background The treatment of perinatal depression is a public-health priority because of its high prevalence and association with disability and poor infant development. We integrated a cognitive behaviour therapy-based intervention into the routine work of community-based primary health workers in rural Pakistan and assessed the effect of this intervention on maternal depression and infant outcomes.

Methods We randomly assigned 40 Union Council clusters in rural Rawalpindi, Pakistan, in equal numbers to intervention or control. Married women (aged 16–45 years) in their third trimester of pregnancy with perinatal depression were eligible to participate. In the intervention group, primary health workers were trained to deliver the psychological intervention, whereas in the control group untrained health workers made an equal number of visits to the depressed mothers. The primary outcomes were infant weight and height at 6 months and 12 months, and secondary outcome was maternal depression. The interviewers were unaware of what group the participants were assigned to. Analysis was by intention to treat. The study is registered as ISRCTN65316374.

Findings The number of clusters per group was 20, with 463 mothers in the intervention group and 440 in the control group. At 6 months, 97 (23%) of 418 and 211 (53%) of 400 mothers in the intervention and control groups, respectively, met the criteria for major depression (adjusted odds ratio (OR) 0·22, 95% CI 0·14 to 0·36, p<0·0001). These effects were sustained at 12 months (111/412 [27%] *vs* 226/386 [59%], adjusted OR 0·23, 95% CI 0·15 to 0·36, p<0·0001).The differences in weight-for-age and height-for-age *Z* scores for infants in the two groups were not significant at 6 months (–0·83 *vs* –0·86, p=0·7 and –2·03 *vs* –2·16, p=0·3, respectively) or 12 months (–0·64 *vs* –0·8, p=0·3 and –1·10 *vs* –1·36, p=0·07, respectively).

Interpretation This psychological intervention delivered by community-based primary health workers has the potential to be integrated into health systems in resource-poor settings.

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Introduction

Depression is the fourth leading cause of disease burden and the largest cause of non-fatal burden, accounting for almost 12% of years lived with disability worldwide.[1] A systematic review suggests an overall mean prevalence of 33% in the Pakistani population, with women at a greater risk than are men.[2] In a previous study of rural Pakistani women, we reported a prevalence of 25% during pregnancy and 28% in the postnatal period.[3] Perinatal depression was associated with high rates of disability, infant malnutrition, increased rates of infant diarrhoea, and reduced uptake of immunisation.[4,5]

Evidence from high-income countries shows that psychotherapeutic approaches, such as cognitive behaviour therapy, interpersonal therapy, or problem-solving, are effective treatments for depression.[6] Randomised trials from low-income and middle-income countries resulted in similar findings.[7,8] However, the overall difficulty in these countries remains the scarcity of mental-health professionals to deliver such interventions to underprivileged communities.[9] The challenge is to adapt these interventions so that they can be delivered by ordinary health workers without previous training in mental health. Furthermore, policy makers in low-income countries need to be convinced of the public health importance of treating mental disorders so that they integrate such interventions into existing health systems.[10]

With a population of more than 130 million, Pakistan is the world's sixth most populous country. It is a low-income country, with an income per person of less than US$500 per year, and 33% of the population live below the poverty line.[11] The literacy rate among women and girls is 35%. The infant mortality rate is about 80 per 1000 livebirths and more than a third of children aged less than 5 years show stunted growth.[12] The proportion of the yearly budget spent on health was 0·7% in 2000–01; no figures are available for the amount spent on mental health. About 350 psychiatrists and

3000 psychiatric beds are concentrated in the major cities, without any specialist mental health services in the rural areas where 67% of Pakistan's population resides.[11]

From earlier quantitative and qualitative studies done in a rural sub-district of Pakistan, we developed an intervention based on principles of cognitive behaviour therapy, which could be delivered by ordinary village-based primary health workers.[3,13] We used a manual (with step by step instructions for each session) to train the health workers and for them to keep for reference. The intervention, called the Thinking Healthy Programme, used cognitive behaviour therapy techniques of active listening, collaboration with the family, guided discovery (ie, style of questioning to both gently probe for family's health beliefs and to stimulate alternative ideas), and homework (ie, trying things out between sessions, putting what has been learned into practice), and applied these to health workers' routine practice of maternal and child health education. The intervention was integrated into existing health systems in a rural sub-district of Pakistan, and pilot studies showed that both health workers and depressed mothers reported the programme to be relevant and useful; further details of the intervention process are described elsewhere.[13]

Our aims were to assess the effect of the intervention on perinatal depression in women, and to test the hypothesis that treatment of perinatal depression would lead to improved nutrition and other health outcomes in the infant.

Methods

Study area and participants

The study was done in two rural areas (ie, Gujar Khan and Kallar Syedan, with a combined population of 600 000), located 65 km southeast of Rawalpindi city. Most families in the area depend on subsistence farming, supplemented by one or more of the men serving in the armed forces or working as government employees, or as semi-skilled or unskilled labourers in the cities.[14] Primary health care is delivered through a network of Basic Health Units, each providing care to about 15 000–20 000 people. Each unit is staffed by a doctor, midwife, vaccinator, and 15–20 village-based community health workers called Lady Health Workers. These women have completed secondary school, and are trained to provide mainly preventive maternal and child health care, and education in the community. Each Lady Health Worker is responsible for about 100 households in her village. About 96 000 health workers in the Lady Health Worker programme provide coverage to more than 80% of Pakistan's rural population (some inaccessible areas, including some of the tribal areas are not covered).[15]

The smallest administrative unit in Pakistan is the Union Council, which has a population of around

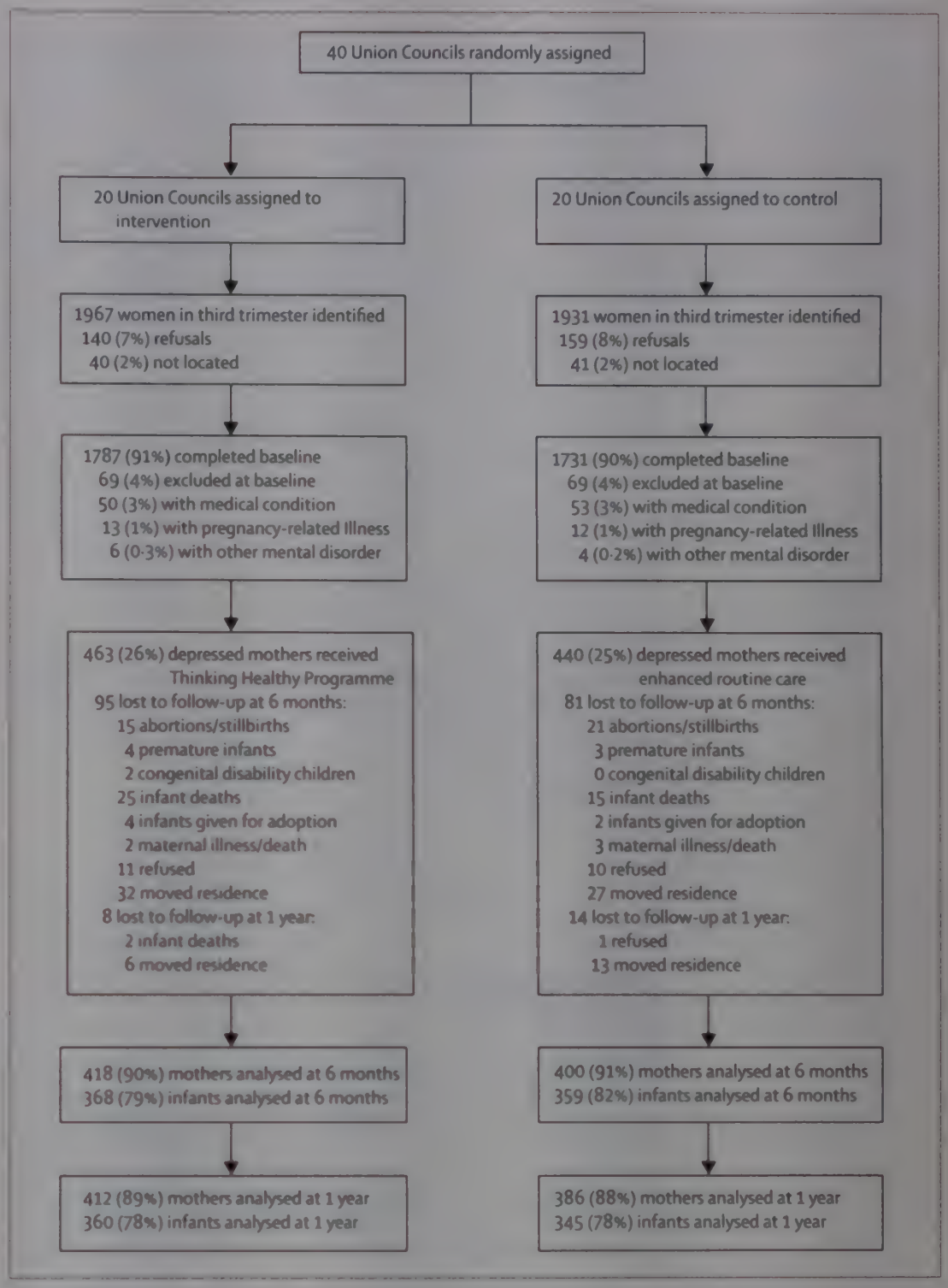
40 Union Councils randomly assigned
20 Union Councils assigned to intervention
20 Union Councils assigned to control
1967 women in third trimester identified
140 (7%) refusals
40 (2%) not located
1931 women in third trimester identified
159 (8%) refusals
41 (2%) not located
1787 (91%) completed baseline
69 (4%) excluded at baseline
50 (3%) with medical condition
13 (1%) with pregnancy-related illness
6 (0·3%) with other mental disorder
1731 (90%) completed baseline
69 (4%) excluded at baseline
53 (3%) with medical condition
12 (1%) with pregnancy-related illness
4 (0·2%) with other mental disorder
463 (26%) depressed mothers received Thinking Healthy Programme
95 lost to follow-up at 6 months:
15 abortions/stillbirths
4 premature infants
2 congenital disability children
25 infant deaths
4 infants given for adoption
2 maternal illness/death
11 refused
32 moved residence
8 lost to follow-up at 1 year:
2 infant deaths
6 moved residence
440 (25%) depressed mothers received enhanced routine care
81 lost to follow-up at 6 months:
21 abortions/stillbirths
3 premature infants
0 congenital disability children
15 infant deaths
2 infants given for adoption
3 maternal illness/death
10 refused
27 moved residence
14 lost to follow-up at 1 year:
1 refused
13 moved residence
418 (90%) mothers analysed at 6 months
368 (79%) infants analysed at 6 months
400 (91%) mothers analysed at 6 months
359 (82%) infants analysed at 6 months
412 (89%) mothers analysed at 1 year
360 (78%) infants analysed at 1 year
386 (88%) mothers analysed at 1 year
345 (78%) infants analysed at 1 year

Figure 1: **Trial profile**

15 000–20 000. This unit was chosen as the cluster unit of randomisation. Normally one Basic Health Unit provides primary health care for one Union Council and all affiliated Lady Health Workers work in villages within that Union Council only. Supervision of health workers takes place in the Union Council. Thus the risk of contamination of the control group with the intervention is negligible. There were 40 Union Councils in the two subdistricts of the study area. These subdistricts were geographically contiguous and ethnically, culturally, and socioeconomically homogeneous. All the units were eligible for randomisation, which was done by an independent trial centre in Islamabad, before recruitment of participants (figure 1). These administrative units were assigned by random allocation with a table of random numbers by a researcher who was not involved in the study and who was unaware of the identity of the Union

	Intervention (N=463)	Control (N=440)
Participants		
Age (years)		
<20	30 (6%)	21 (5%)
20–24	138 (30%)	122 (28%)
25–29	154 (33%)	150 (34%)
30–34	90 (19%)	87 (20%)
>35	51 (11%)	60 (14%)
Mean age	26·5 (5·2)	27·0 (5·1)
Schooling (years)		
0	184 (40%)	190 (43%)
1–6 (primary)	147 (32%)	128 (29%)
7–10 (secondary)	116 (25%)	105 (24%)
>10	16 (3%)	17 (4%)
Mean schooling	4·2 (4·0)	3·9 (3·9)
Body-mass index	23·3 (4·1)	23·1 (4·1)
Financially empowered	238 (51%)	240 (55%)
Mean depression score*	14·8 (4·2)	14·4 (4·0)
Mean disability score†	8·1 (2·7)	8·3 (2·7)
Family		
Extended/joint family	250 (54%)	280 (64%)
Illiterate husband	87 (19%)	78 (18%)
Number of children		
0	89 (19%)	82 (19%)
1–2	191 (41%)	171 (39%)
3–4	133 (29%)	137 (31%)
>5	50 (11%)	50 (11%)
Mean number	2·2 (1·8)	2·3 (1·8)
Socioeconomic status		
Health workers' rating		
1 (richest)	6 (1%)	6 (1%)
2	43 (9%)	38 (9%)
3	173 (37%)	170 (39%)
4	142 (31%)	128 (29%)
5 (poorest)	99 (21%)	98 (22%)
In debt	266 (57%)	235 (53%)
Rated below 3 and in debt	169 (37%)	158 (36%)
Ownership of assets and amenities		
Own land	242 (52%)	238 (54%)
Electricity	442 (95%)	412 (94%)
Television	278 (60%)	263 (60%)
Refrigerator	169 (37%)	151 (34%)
Source of drinking water		
Well without pump	178 (38%)	178 (40%)
Well with pump	158 (34%)	141 (32%)
Piped onto residence or property	30 (6%)	26 (6%)
Other	97 (21%)	95 (22%)
Type of toilet facility		
Field	253 (55%)	251 (57%)
Flush toilet	126 (27%)	109 (25%)
Other (pit, bucket)	84 (18%)	80 (18%)

Data are number (%) or mean (SD). *Hamilton Depression Rating Scale. †Brief Disability Questionnaire.

***Table 1:* Demographics and baseline characteristics of participants in intervention and control clusters**

Councils. Lady Health Workers from each Union Council were enrolled to participate in the study before randomisation.

Participants were women in the 40 Union Councils who were aged 16–45 years, married, and in their third trimester of pregnancy. They were enrolled from April, 2005, to March, 2006. Lists of participants were compiled from official registers kept with the Lady Health Workers. To ensure full coverage, we did an additional door-to-door survey to identify women not registered. We excluded women with a diagnosed serious medical condition requiring inpatient or outpatient treatment, pregnancy-related illness (except for common conditions, such as anaemia), substantial physical or learning disability, and postpartum or other form of psychosis (figure 1).

We did baseline (ie, at the third trimester of pregnancy) assessments after the women had been identified in each Union Council. The assessments were done by experienced psychiatrists (AM and SS) who were trained to administer the structured clinical interview for Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV diagnosis,[16] which is a semi-structured diagnostic interview that has been widely used in cross-cultural epidemiological and treatment studies of prenatal and postnatal depression.[17] We translated and culturally adapted the section for major depressive episode into Urdu with a rigorous procedure developed in Pakistan for previous studies.[18] We established inter-rater reliability before starting the study—both interviewers independently assessed 20 women (ten had clinical depression) and agreed on the diagnosis of 19 (κ=0·90). All women who fulfilled the criteria for a DSM-IV major depressive episode were recruited into the trial (figure 1). The interviewers assessed depressed women at baseline with the Hamilton Depression Rating Scale,[19] a measure of depressive symptoms that has 17 items and a total score from 0 to 54 (with higher scores indicating increased severity of depression). The interviewers were unaware of the allocation status of the Union Councils (because they had no contact with the team that did the randomisation), and we took care to ensure they remained so; none of the interviewers resided in the study area, and throughout the duration of the study they had no contact with the Lady Health Workers or any other health personnel in the study area. Mothers were asked not to tell the interviewers anything about their sessions with Lady Health Workers.

We used questionnaires that we had translated and adapted in our previous studies for the other baseline assessments.[3,20] These assessments included the brief disability questionnaire,[21] an eight-item questionnaire that rates present difficulties in doing daily activities on a scale of 0 (not at all) to 2 (definitely), with a maximum score of 16; global assessment of functioning scale,[22] a 100-point scale reporting the clinician's assessment of

the patient's overall psychological, social, and occupational functioning on a hypothetical continuum (with a higher score indicating better functioning); and the multidimensional scale for perceived social support,[23] a 12-item Likert scale measuring the subjective assessment of adequacy of social support from family, friends, and partners (higher score indicating greater social support). We gathered data for socioeconomic status and demographic characteristics.

We obtained informed verbal and written consent from the participants. Ethical approval for the study was granted by committees of the University of Manchester, UK, and the Institute of Psychiatry, Rawalpindi, Pakistan.

Intervention and control groups

Mothers in the intervention clusters received the Thinking Healthy Programme through 40 specially trained Lady Health Workers (ie, two for each Union Council cluster). Participants only knew that they were receiving one of two types of visits from the health workers. The intervention consisted of a session every week for 4 weeks in the last month of pregnancy, three sessions in the first postnatal month, and nine 1-monthly sessions thereafter.[13] Mothers in the control clusters received an equal number of visits in exactly the same way as those in the intervention group, but by routinely trained Lady Health Workers (two for each Union Council). These health workers in both groups received monthly supervision, and were monitored by the research team to ensure that they were attending the scheduled visits. In practice, the Lady Health Workers seldom provide such structured and monitored care in the community. The control group thus received what would be regarded as ideal care, which we called enhanced routine care.

Outcome assessments at follow-up

Infants who were aborted, stillborn, born premature or congenitally disabled, given up for adoption, or died in the first year were excluded from the study (figure 1). Mothers, who became seriously ill, died, or moved residence were excluded (figure 1). Mothers in both the intervention and control groups were re-interviewed by the same psychiatrists at 6 months and 12 months postnatally. Infants in both groups were weighed and measured with standard techniques.[24] Growth data were converted into SDs (*Z* scores) for weight and length with Epi Info 2002 (version 3.4.1).

Additionally, at 6 months, mothers were asked if they were exclusively breastfeeding. At 12 months, the number of diarrhoeal episodes in the infants in the 2 weeks before interview was recorded with a questionnaire used in previous studies;[5] diarrhoea was defined as three or more unformed stools passed in 24 h, and a diarrhoeal episode was defined as being separated from another episode by at least 3 diarrhoea-free days. Records of immunisation were assessed at 12 months for all infants in the study, and infants were classified as those with or without up-to-date immunisation status. At 12 months, mothers were asked if they were using any form of contraception, and both parents were asked if they set aside time everyday to play with their infant. All infant outcomes were assessed by researchers unaware of the psychiatric status of the mother.

	Intervention	Control	ICC	Adjusted odds ratio (95% CI)*	p value
6 months	97/418 (23%)	211/400 (53%)	0·047	0·22 (0·14–0·36)	<0·0001
12 months	111/412 (27%)	226/386 (59%)	0·037	0·23 (0·15–0·36)	<0·0001

Data are number (%), unless otherwise indicated. Diagnosis of major depression based on Diagnostic and Statistical Manual of Mental Disorders-IV criteria. ICC=intra-cluster correlation coefficient. *Adjusted for baseline depression score, mothers' age, parity, education, socioeconomic status, and infant sex with a logistic regression model with random effect for Union Council.

Table 2: **Comparison of changes in rates of diagnosable major depression after intervention at 6 months and 12 months postnatally**

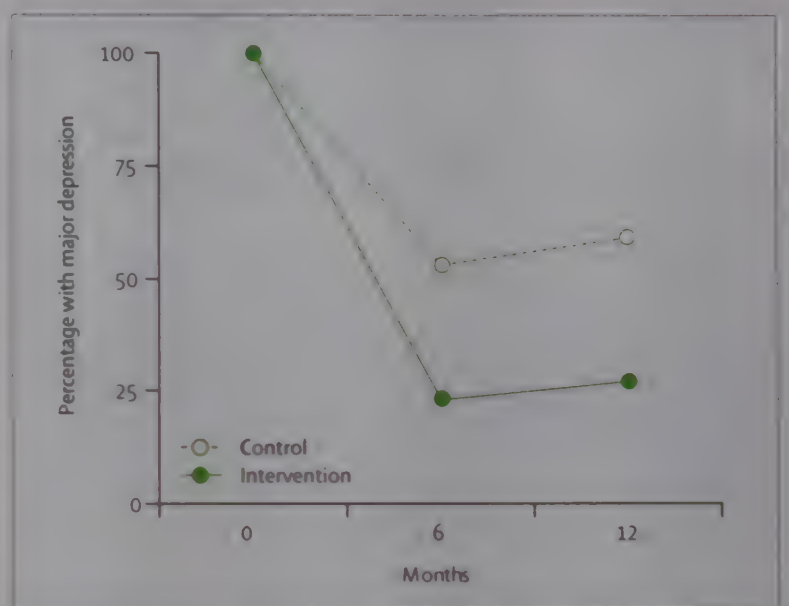

Figure 2: **Rates of depression in women in the control and intervention groups at 6 months and 12 months**

Statistical analysis

Because we wanted to study the effect of the intervention on infant outcomes, we did our sample-size calculations with infant nutrition as the primary outcome. On the basis of previous observational work,[4] we estimated a difference of 0·62 SD in infant weight-for-age *Z* score between intervention and control groups. The unit of randomisation was the Union Council. With 20 Union Councils in each group, 18 mothers per Union Council, and assuming an intra-cluster correlation coefficient of 0·05, a sample size of 360 in each group would give more than 95% power to detect the effect size at a significance level of 0·05. The same sample size would give us a power of more than 80% to detect a difference of 0·3 SD with maternal depression as the secondary outcome.

The Manchester centre, under the supervision of the trial statistician (CR), independently undertook the analysis. We based the statistical analysis on a

	Intervention	Control	ICC	Adjusted mean difference (95% CI)*	p value
Depression score†					
Baseline	463 (14·8, 4·2)	440 (14·4, 4·0)	n/a	n/a	n/a
6 months	418 (4·5, 6·0)	400 (8·7, 7·4)	0·090	−5·86 (−7·92 to −3·80)‡	<0·0001
12 months	412 (5·4, 6·5)	386 (10·7, 8·1)	0·056	−6·65 (−8·56 to −4·74)‡	<0·0001
Disability score§					
Baseline	440 (8·1, 2·7)	440 (8·3, 2·7)	n/a	n/a	n/a
6 months	418 (2·3, 3·1)	400 (4·2, 3·9)	0·061	−1·80 (−2·48 to −1·12)	<0·0001
12 months	412 (2·2, 3·3)	386 (5·2, 4·5)	0·060	−2·88 (−3·66 to −2·10)	<0·0001
Function score¶					
Baseline	440 (62, 5·1)	440 (62, 5·3)	n/a	n/a	n/a
6 months	418 (79, 9·9)	400 (72, 11·9)	0·060	6·85 (4·73 to 8·96)	<0·0001
12 months	412 (78, 9·9)	386 (69, 12·0)	0·047	8·27 (6·23 to 10·31)	<0·0001
Perceived social support score‖					
Baseline	440 (46, 16·6)	440 (44·5, 16·3)	n/a	n/a	n/a
6 months	418 (50·8, 15·3)	400 (43·7, 15·7)	0·043	6·71 (3·93 to 9·48)	<0·0001
12 months	412 (51·0, 12·1)	386 (42·5, 13·8)	0·059	7·85 (5·43 to 10·27)	<0·0001

Data are number (mean, SD), unless otherwise indicated. ICC=intra-cluster correlation coefficient. n/a=not applicable. *Adjusted for baseline scores, mother's age, parity, education, infant sex, and socioeconomic status with random effect for Union Council. †Hamilton Depression Rating Scale[19] (maximum score 54; higher score indicating greater severity). ‡Random-effect Tobit regression due to number of zero scores. §Brief Disability Questionnaire[21] (maximum score 16; higher score indicating greater disability). ¶Global Assessment of Functioning Scale[22] (maximum score 100, higher score indicating improved functioning). ‖Multidimensional scale for perceived social support[23] (maximum score 84; higher score indicating better perceived social support).

Table 3: **Effect of intervention on depression, disability, functioning, and perceived social support scores**

random-effects model with random effects for Union Council and mother.[25] For outcomes, we included covariates in the model for baseline value of the outcome, and mother's age, education, parity, infant sex, and socioeconomic status. We checked distributional assumptions with normal probability plots of patient and Union Council residuals. We analysed binary and ordinal outcomes with a random-effects logistic regression model with the same covariates, and did statistical analyses with STATA 9 (version 9.0). In the intervention group, we compared weight and height of the infants born to mothers whose depressive disorder had and had not resolved.

The study is registered as ISRCTN65316374.

Role of the funding source

The sponsor of the study had no role in the design, data analysis, data interpretation, writing of the report, or in the decision to submit the report for publication. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Figure 1 shows the trial profile. At birth, 226 (51%) of 440 infants in the intervention group and 223 (48%) of 463 in the control group were boys. Table 1 shows the baseline characteristics. Table 2 and figure 2 show the prevalence of DSM-IV major depressive episodes in the two groups at 6 months and 12 months. At both time points, the prevalence was much higher in the control group than in the intervention group. The cluster-adjusted odds ratio (OR) for major depression among women in the control clusters compared with those in the intervention clusters was highly significant and remained so after adjustment for covariates.

Mothers in the intervention group had lower depression scores and lower disability scores at both time points than did mothers in the control group (table 3). Similarly, mothers in the intervention group had better overall functioning and perception of social support (table 3). The differences remained significant when adjusted for baseline scores of each measure, mother's age, education, parity, infant sex, and socioeconomic status (table 3).

The differences between the intervention and control groups in weight-for-age *Z* scores or height-for-age *Z* scores at 6 months or 12 months were not significant, although at 12 months the number of stunted infants in the intervention arm was less than that in the control arm (table 4). Further analysis of the intervention group showed that infants whose mothers were still depressed at 6 months had significantly lower *Z* scores at both 6 months (weight-for-age −1·2 *vs* −0·73, p=0·0003; height-for-age −0·94 *vs* −0·55, p=0·0033) and 12 months (weight-for-age −2·2 *vs* −1·95, p=0·0149; height-for-age −1·5 *vs* −0·98, p<0·0001) than did infants whose mothers had recovered. The associations remained significant after we controlled for all sociodemographics listed in table 1 with multivariate analysis, indicating that untreated maternal depression contributed to infant undernutrition substantially and independently even in the intervention group.

The rate of stunting and underweight rose sharply from 6 months to 12 months in both intervention and control groups (table 4). This rise is a recognised occurrence in infants because the risk of malnutrition begins to increase after 6 months of age when most children stop breastfeeding and begin relying on solid foods. However, the overall rate of underweight in the two groups was higher than the overall rate at this age reported for Pakistan (42%),[12] and was probably the effect of untreated maternal depression in both groups (table 4).

Infants in the intervention group were less likely to have had a diarrhoeal episode in the 2 weeks preceding the 12-month assessment and were more likely to have completed their scheduled immunisation (table 5). Contraceptive use by mothers in the intervention group was significantly higher than in the control group (table 5). The rate of exclusive breastfeeding was higher in the intervention group, although not significant (table 5). Both parents in the intervention group reported spending more time everyday on play-related activities with the infant than did parents in the control group (table 5).

Discussion

The intervention did not produce any significant change in infant growth indices but had other benefits—ie, infants had less episodes of diarrhoea and were more likely to be immunised than those in the control group; mothers were more likely to use contraception (birth spacing is an important factor in reducing infant morbidity), and both parents reported spending more time playing with their infants. In a poor rural community with little access to mental health care, integration of a cognitive behaviour therapy-based intervention into the routine work of community health workers more than halved the rate of depression in prenatally depressed women compared with those receiving enhanced routine care. In addition to symptomatic relief, the women receiving the intervention had less disability and better overall and social functioning, and these effects were sustained after 1 year.

This community-based trial had a high response and follow-up rate. Assessments were done by trained and experienced researchers who were from the same cultural background as the depressed women, and all instruments were culturally adapted. The cluster design ensured that the risk of contamination was negligible. Although cluster-randomised trials are susceptible to bias, the baseline characteristics in the two groups were similar, and efforts were made to ensure that the assessors remained unaware of the allocation. The trial did not capture mothers who were not depressed in pregnancy and developed a depressive episode postnatally. However, our previous study in the same area showed that in more than 90% of the women, postnatal depression was a continuation of a depressive episode during pregnancy[3] and therefore targeting women for intervention during pregnancy was the correct strategy.

The rate of stunting in infants in the intervention group was non-significantly less than that in the control group. Height for age is more responsive to repeated or longer term adverse conditions (such as maternal depression) than is weight for age, which responds to acute adversity.[27] Growth is likely to be affected by complex interactions between maternal, child, and environmental variables. The benefits of improved maternal mental health on infant nutrition, possibly mediated through improved stimulation, care, and responsive feeding are likely to be cumulative and develop during time. A longer follow-up might have shown significant effects of the intervention. The finding that infants whose mothers did not respond to treatment had poor growth, even after controlling for sociodemographic factors, strengthens the argument for an important role of maternal depression in infant undernutrition. Thus, earlier interventions (before depression becomes chronic), and development of secondary-care and tertiary-care facilities for depressed women who do not respond to primary care, might be necessary.

Of note, our comparisons were not between intervention and treatment as usual but intervention and enhanced routine care. The rate of recovery from depression in the control group at 6 months (47%) was greater than the rate of spontaneous remission without treatment we reported in our previous observational study in the same area (24%).[28] We did not assess whether the Lady Health Workers in the control group took action to treat the mothers' depression (other than monitoring their visits). Even regular, monitored visits by experienced health workers could have had therapeutic benefits, which could have diluted the effects of our intervention on our primary outcome. Such treatment effects with control groups have been reported in other trials in developing countries.[29]

Even in high-income countries, more than 50% of people in the community with major depression are

	Intervention	Control	ICC	Adjusted mean difference (95% CI)*	p value
6 months				0·07 (−0·09 to 0·23)	0·38
Stunted†	32/368 (9%)	32/359 (9%)			
HAZ	−0·64 (1·04)	−0·8 (1·01)	0·019		
12 months				0·17 (−0·02 to 0·35)	0·07
Stunted*	66/360 (18%)	81/345 (23%)			
HAZ	−1·10 (1·02)	−1·36 (1·17)	0·032		
6 months				−0·02 (−0·18 to 0·14)	0·76
Underweight*	43/368 (12%)	43/359 (12%)			
WAZ	−0·83 (1·06)	−0·86 (1·00)	0·017		
12 months				0·07 (−0·08 to 0·22)	0·37
Underweight*	215/360 (60%)	223/345 (65%)			
WAZ	−2·03 (1·01)	−2·16 (1·03)	0·004		

Data are n/N (%) or mean (SD), unless otherwise indicated. HAZ=height-for-age Z score. WAZ=weight-for-age Z score. ICC=intra-cluster correlation coefficient. *Adjusted for maternal height and weight, parity, education, infant sex, baseline depression, disability, and perceived social support scores with regression model with random effect for Union Council. †A child is considered stunted or underweight if the growth is less than the anthropometric cutoff of −2 SD below the median WAZ and HAZ scores of the National Center for Health Statistics/WHO international references.[26]

Table 4: **Effect of intervention on infant growth**

	Intervention	Control	ICC	Adjusted odds ratio (95% CI)*	p value
Health outcome					
Diarrhoea episodes at 12 months†	116/360 (32%)	149/345 (43%)	0·056	0·6 (0·39–0·98)	0·04
Complete immunisation at 12 months	339/360 (94%)	294/345 (85%)	0·013	2·5 (1·47–4·72)	0·001
Contraceptive use at 12 months	253/406 (62%)	205/385 (53%)	0·003	1·6 (1·20–2·27)	0·002
Exclusive breastfeeding at 6 months	63/368 (17%)	40/359 (11%)	0·070	1·6 (0·79–3·18)	0·20
Play frequency with infant at 12 months‡					
Mother	247/360 (69%)	149/345 (43%)	0·005	2·4 (2·07–4·01)	<0·0001
Father	191/302 (63%)	119/285 (42%)	0·058	1·9 (1·59–4·15)	0·0001

Data are n/N (%), unless otherwise indicated. ICC=intra-cluster correlation coefficient. *Adjusted for parity, education, infant sex, socioeconomic status, baseline depression, disability, and perceived social support with a random effect for Union Council. †One or more in 2 weeks before assessment. ‡Once or more every day.

Table 5: **Effect of intervention on activities affecting infant health**

not treated because access to mental health care is absent.[30] In low-income countries, this value is 70–100%.[31] This intervention has the potential of providing mental health care at the doorstep to a very high proportion of women with this highly prevalent and disabling mental disorder in Pakistan and other low-income countries. This programme is not vertical (ie, focusing solely on depression); it is dependent on a separate mental-health workforce. On the contrary, the integrated cognitive behaviour therapy-approach eases the routine work of health workers with women who are otherwise socially excluded and difficult to access, and has added benefits, such as improvement of infant health outcomes. Indeed, the intervention led to an increased rate of immunisation and uptake of contraception, the two key tasks for Lady Health Workers. These effects, combined with the high prevalence of maternal depression, should make this intervention of interest to policy makers.

The intervention was designed to be integrated into the routine work of the Lady Health Workers, and feedback from the 40 trained women showed that almost all of them thought it was relevant to their day-to-day work and none of them considered it an extra burden.[13] The training was short (2 days followed by a 1 day refresher after 4 months) and therefore feasible on a large scale. However, an important component of the training process was the monthly half-day group supervision, which, for this study, was provided by experienced members of the research team.[13] Regular and reliable training and supervision are essential for the success of community health worker-based programmes.[32] Working with depressed individuals and their families in very poor settings can be stressful for the health workers; therefore, strong supervisory mechanisms need to be in place when scaling up a programme of this nature. This supervision could be in the form of peer groups in which health workers from each locality meet on a regular basis to discuss the families they are caring for. In our experience, such meetings in which health workers brainstorm for solutions and discuss their successes and failures in a supportive environment can be a sustainable model for supervision in places without resources to employ trained supervisors.[13] Guidelines for such peer supervision would need to be incorporated into training.

Worldwide, the importance of mental health in achieving developmental goals, such as those endorsed by the UN's Millennium Development project has received increased recognition.[33] However, this recognition is not matched by the development of an evidence-base for cost-effective interventions that can be scaled up in resource-poor settings. We believe this study suggests directions such interventions could take to make mental health an important component of public-health programmes.

Contributors

AR conceived the study, developed the research design and wrote the first draft of the report. AR and FC supervised all aspects of study. AM and SS assisted with development of instruments and training material, and gathered data. CR analysed the data and tabulated the results. All authors helped to interpret findings and review the report. All authors have seen and approved the final version of the report to be published.

Conflict of interest statement

We declare that we have no conflict of interest.

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How much does quality of child care vary between health workers with differing durations of training? An observational multicountry study

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See **Editorial** page 863

See **Comment** page 870

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Summary

Background Countries with high rates of child mortality tend to have shortages of qualified health workers. Little rigorous evidence has been done to assess how much the quality of care varies between types of health workers. We compared the performance of different categories of health workers who are trained in Integrated Management of Childhood Illness (IMCI).

Methods We analysed data obtained from first-level health facility surveys in Bangladesh (2003), Brazil (2000), Uganda (2002), and Tanzania (2000). We compared the clinical performance of health workers with longer duration of preservice training (those with >4 years of post-secondary education in Brazil or >3 years in the other three countries) and shorter duration (all other health workers providing clinical care). We calculated quality of care with indicators of assessment, classification, and management of sick children according to IMCI guidelines. Every child was examined twice, by the IMCI-trained health worker being assessed and by a gold-standard supervisor.

Findings 272 children were included in Bangladesh, 147 in Brazil, 231 in Tanzania, and 612 in Uganda. The proportions of children correctly managed by health workers with longer duration of preservice training in Brazil were 57·8% (n=43) versus 83·7% (n=61) for those with shorter duration of training (p=0·008), and 23·1% (n=47) versus 32·6% (n=134) (p=0·03) in Uganda. In Tanzania, those with longer duration of training did better than did those with shorter duration in integrated assessment of sick children (mean index of integrated assessment 0·94 [SD 0·15] *vs* 0·88 [0·13]; p=0·004). In Bangladesh, both categories of health worker did much the same in all clinical tasks. We recorded no significant difference in clinical performance in all the other clinical tasks in the four countries.

Interpretation IMCI training is associated with much the same quality of child care across different health worker categories, irrespective of the duration and level of preservice training. Strategies for scaling up IMCI and other child-survival interventions might rely on health workers with shorter duration of preservice training being deployed in underserved areas.

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Introduction

About 10 million children die every year, with most deaths occurring in low-income countries—mainly sub-Saharan Africa and south Asia.[1] However, two-thirds of these deaths could be avoided if all children had access to cost-effective preventive and curative interventions that have been available for several years.[2]

Maternal, infant, and child survival increase with the ratio of health workers to the population.[3] On the basis of empirical data, WHO concluded that countries with fewer than 2·3 health-care professionals per 1000 people are less likely to achieve 80% coverage rates for deliveries by a skilled attendant than are those with a higher ratio of health-care professionals.[4] The coverage of measles immunisation has also been associated with health-worker ratio.[5] Many high-mortality countries have serious health-worker shortages—eg, the African region accounts for about half of all deaths in children younger than 5 years and has only 3% of the global health workforce.[4,6]

An insufficient number of motivated, well-trained health personnel is a major limitation for scaling up effective interventions. Task shifting, or the devolution of selected clinical responsibilities to health workers with shorter duration of preservice training (ie, training undertaken before obtaining a degree from school), is increasingly seen as an option to address the shortages of personnel.[7]

The Integrated Management of Childhood Illness (IMCI) is a global strategy that has been adopted by more than 100 countries. IMCI has three components: improving performance of health workers, strengthening health systems, and improving family and community practices that are relevant to child health. Its clinical guidelines describe how to assess, classify, and manage children younger than 5 years who have common illnesses. The guidelines are intended for use by all types of health workers (doctors, medical assistants, nurses, or literate paramedical workers) who, after being trained in IMCI, provide care in first-level outpatient health facilities.[8] Emphasis is given to the use of clinic visits by sick children, irrespective of the type of illness, as an opportunity for the delivery of preventive interventions.

The Multi-Country Evaluation (MCE) of IMCI assessed the effectiveness and cost of the three components of IMCI in five countries (Bangladesh, Brazil, Peru, Tanzania, and Uganda). Apart from Peru, surveys administered in health facilities gathered data for health-worker performance allowing the assessment of the training component of IMCI. These surveys are done in countries with the highest number of deaths in children younger than 5 years worldwide.[1] Doctors and nurses were the only health personnel trained in IMCI in Brazil, whereas paramedical workers were also trained in the other three countries. IMCI training was successfully scaled up in Tanzania and Bangladesh. In Brazil, achieved training coverage was low (<10%), and in Uganda the fast scaling up of training had a negative effect on training.[9] Precise estimates of the proportions of first-level facility workers who were trained in IMCI are not available since none of the four countries that we studied routinely collected comprehensive training statistics, indicating inadequacies in their monitoring systems.

In addition to high and equitable intervention coverage, good quality of care is a criterion for improving child health.[10] Little rigorous evidence has been done to assess the comparative clinical performance of physicians and nurses, especially in primary health care. A recent systematic review showed that doctor–nurse substitution in primary care resulted in much the same quality of care, although the study had several methodological problems.[11] A report from the Brazil IMCI assessment suggested that nurses did as well as doctors, if not better, in several clinical tasks.[12] Task shifting of clinical responsibilities is not restricted to doctors and nurses. There is increasing advocacy for a greater involvement of non-physician clinicians, especially in sub-Saharan Africa,[13] where such personnel could help to scale up interventions for child survival. However, task shifting takes place within a context and needs to be accompanied by other measures such as standardised training, supervision, certification and assessment, and adaptations of incentives for it to be successful.[7] Rigorously designed studies on quality of care that is provided by these health workers are urgently needed for task shifting to be promoted as an evidence-based strategy for improvement of child health.

On the basis of data from four MCE countries (Bangladesh, Brazil, Tanzania, and Uganda), we aimed to assess how different categories of IMCI-trained health workers vary in terms of quality of child care.

***Panel:* Index of integrated child assessment[14]**

This index assesses the quality and completeness of the assessment provided to sick children. Each of the 14 items below is coded as 0 (not assessed) or 1 (assessed). Three additional items on feeding assessment are included for children younger than 2 years.

For all children

1 Check for ability to drink or breastfeed
2 Check whether the child vomits everything
3 Check whether the child has had convulsion
4 Check for cough or difficult breathing
5 Check for diarrhoea
6 Check for fever
7 Child weighed on the same day as the survey visit
8 Child's weight checked against a recommended growth chart
9 Check for palmar pallor
10 Check for visible severe wasting
11 Check for oedema of both feet
12 Child's vaccination status checked
13 Child's temperature checked
14 Check for other problems

For children younger than 2 years of age

15 Ask about breastfeeding
16 Ask if the child takes any other foods or fluids
17 Ask whether feeding has changed during the illness

Methods

Study design and setting

Our analyses are restricted to the first component of IMCI—namely, improvement of health-worker performance. We analysed data obtained as part of the MCE through first-level health facility surveys in Bangladesh (2003), Brazil (2000), Uganda (2002), and Tanzania (2000) to compare the performance of clinical tasks by health workers. We assessed health workers who had received in-service IMCI training. The surveys were undertaken in each country by trained surveyors who assessed the quality of care that was provided to sick children. We included either all health government facilities in the study areas (14 facilities in Bangladesh) or a probability sample of these facilities (88 facilities in Brazil, 39 in Tanzania, and 124 in Uganda).

The study was approved by the ethics review boards in the four countries. Health workers and patients provided verbal consent to have the consultations observed by a third party and to the re-examination procedure.

Data collection and procedures

Data collection entailed observation of case management by IMCI-trained health-care workers and re-examination of children by a trained gold-standard surveyor—an IMCI-trained physician supervisor who was unaware of the original diagnosis and treatment by the facility worker. The surveys measure the performance of health workers in clinical tasks—eg, how well they assess, classify, and manage sick children and counsel their caretakers. The generic data-collection tools are available from the MCE website.

For the **Multi-Country Evaluation website** see http://www.who.int/imci-mce

Country-level data were revised and checked for consistency. We calculated indicators of health-worker performance, including the index of integrated assessment and indicators of correct classification and management for IMCI priority and non-priority illnesses.[14,15]

We used standard definitions for calculation of the performance indicators. The index of integrated child

	Level of preservice training	Duration of preservice training*	Number of children examined	Study classification
Bangladesh				
Medical assistants	Post-secondary school	4 years	84	Longer duration training
Subassistant community medical officer	Post-secondary school	4 years	117	Longer duration training
Family welfare visitors	Post-secondary school	18 months	71	Shorter duration training
Brazil				
Medical doctors	University	6 years	74	Longer duration training
Nurses	University	4 years	73	Shorter duration training
Tanzania				
Clinical officers	Post-secondary school or in-service upgrade	2–4 years	57	Longer duration training
Assistant clinical officers	Post-secondary school or in-service upgrade	2–4 years	110	Longer duration training
Maternal and child health aides	Post-primary school or in-service upgrade	2 years	12	Shorter duration training
Nurse assistants	Post-primary school or in-service upgrade	1 year	52	Shorter duration training
Uganda				
Physicians	University	5 years	11	Longer duration training
Clinical officers	Post-secondary school	36 months	191	Longer duration training
Nurses	Post-secondary school	18–36 months	136	Shorter duration training
Midwives	Post-secondary school	18–36 months	79	Shorter duration training
Nurse assistants	Post-primary school	3 months	181	Shorter duration training
Others	Variable	Variable†	14	Shorter duration training

Data from MCE health facility surveys. *Values are provided by key informants at the Ministry of Health in each country who described the typical duration of preservice training for each category. †This category in Uganda includes workers with variable qualifications who were providing child care in the facilities when the survey took place. Some of these workers were janitors or clerical staff with no former preservice training, and thus we cannot provide more detailed information about their duration of training.

Table 1: **Description of the types of IMCI-trained health workers, by country**

	Longer duration training	Shorter duration training	p value
Index of integrated assessment of children*			
Bangladesh (n=272)	0·73 (0·15)	0·72 (0·12)	0·62
Brazil (n=147)	0·48 (0·18)	0·53 (0·18)	0·05
Tanzania (n=231)	0·94 (0·13)	0·88 (0·13)	0·004
Uganda (n=612)	0·59 (0·25)	0·60 (0·23)	0·56
Children correctly classified			
Bangladesh (n=272)	145 (71·9%)	47 (66·7%)	0·41
Brazil (n=147)	45 (61·4%)	53 (73·2%)	0·14
Tanzania (n=231)	126 (75·6%)	51 (79·7%)	0·53
Uganda (n=612)	91 (45·0%)	161 (39·3%)	0·25
Children correctly managed			
Bangladesh (n=272)	126 (62·7%)	48 (67·6%)	0·47
Brazil (n=147)	43 (57·8%)	61 (83·7%)	0·008
Tanzania (n=231)	107 (64·4%)	40 (62·7%)	0·82
Uganda (n=612)	47 (23·1%)	134 (32·6%)	0·03

Data are mean (SD) or number (%) of children. All values are unadjusted. *Panel provides an explanation of the index of integrated assessment of children.

Table 2: **Integrated assessment, classification, and management of children by IMCI-trained health workers, stratified by length of preservice training**

assessment measures the completeness of the assessment of sick children, and was derived as the mean of 14 tasks that have to be routinely undertaken on all sick children according to the IMCI guidelines (panel).[14] This index was validated and showed high reliability.[14] Correct classification is defined as the proportion of children whose diagnostic classifications according to the health worker match all those that were given by the gold-standard surveyor. This indicator was presented separately for IMCI priority and non-priority diseases.[14] Correct management is defined as provision of the correct drug, in the correct formulation (dose, times per day, number of days), and for which the health worker explained correctly to the patient or carer how to administer the drug at home.[14]

We aimed to assess the performance of health workers providing care to children. In Brazil, only doctors and nurses provided this type of care, but several other categories of health workers were involved in the other three countries. The assessment of educational levels of the health workforce is essential because the knowledge and skills that are acquired during preservice training (ie, before degree from school is obtained) affect health workers' performance.[16,17] In our analyses, IMCI-trained health workers were categorised into two groups—those with longer duration of training and those with shorter duration of training—on the basis of their professional category, level, and duration of preservice training (table 1). Because of variability in the duration of preservice training, different cutoff points were used in every country. We categorised health workers with more than 4 years of post-secondary education in Brazil, or with 3 or more years on average in the other three countries, as the group with longer duration of training. All other health workers providing clinical child care were included in the group with shorter duration of training (table 1). Throughout this Article, we refer to duration and level of preservice training to describe the comparisons being made.

Statistical analysis

The units of analyses were consultations with children younger than 5 years. Because data collection took place on one day in every facility, all children were seen only once. 272 children were included in Bangladesh, 147 in Brazil, 231 in Tanzania, and 612 in Uganda. All surveys were reported separately.[12,15,18,19] We used *t* tests from individual samples to compare the index of integrated management between groups with longer and shorter duration of training, whereas we compared the performance in correct classification and correct management between the same groups with χ^2 tests.

Control for confounding variables was done with the general linear model[20] when the dependent variable was continuous (index of integrated assessment). In this analysis, type of health worker (recoded into two categories: shorter and longer duration of preservice

	Adjusted mean difference (95%CI) between health workers with shorter and longer preservice training	p value
Bangladesh*	−0·01 (−0·05 to 0·02)	0·46
Brazil†	0·19 (0·08 to 0·30)	0·001
Tanzania‡	−0·06 (−0·09 to −0·02)	0·004
Uganda§	0·01 (−0·03 to 0·06)	0·51

Adjusted mean difference through general linear model. *Adjusted for child age, and child sex. †Adjusted for child age, child sex, municipality, and facility type. ‡Adjusted for child age, child sex, district, and facility type. §Adjusted for child age, child sex, and district category.

Table 3: **Index of integrated assessment of children by IMCI-trained health workers**

	Crude odds ratios (95% CI)	p value	Adjusted odds ratios (95% CI)	p value
Correct classification				
Bangladesh	1·28 (0·71–2·31)	0·41	1·28 (0·70–2·31)	0·42
Brazil	0·58 (0·29–1·19)	0·14	0·39 (0·09–1·66)	0·20
Tanzania	0·79 (0·38–1·64)	0·53	0·98 (0·39–1·82)	0·98
Uganda	1·26 (0·85–1·86)	0·25	1·28 (0·87–1·90)	0·22
Correct management				
Bangladesh	0·8 (0·45–1·45)	0·47	0·81 (0·45–1·47)	0·49
Brazil	0·27 (0·09–0·73)	0·008	0·11 (0·02–0·73)	0·02
Tanzania	1·02 (0·86–1·21)	0·82	1·56 (0·70–3·49)	0·28
Uganda	0·62 (0·41–0·95)	0·03	0·59 (0·38–0·90)	0·01

Adjustment for confounding factors was made through logistic regression.

Table 4: **Odds ratios for correct classification and management by IMCI-trained health workers with longer duration of training compared with those with shorter duration of training**

training) was entered in the model as the random factor, district or municipality as a fixed factor, and the covariates were type of health facility, age of child, and sex of child. We used logistic regression for dichotomous outcomes (correct classification and management). In Bangladesh, information about type of health facility was not available. In Uganda, most information about facility type was missing and could not be included in the adjusted model.

Because most health workers examined more than one child, the analyses should consider such clustering. We were able to do this analysis for Uganda and Bangladesh, but the Brazil and Tanzania datasets did not include an identification variable that allowed these analyses. The analyses that we present are not clustered to keep consistency across the four countries. The statistical analyses were done with SPSS (version 11.0) and Stata (version 9.0).

Role of the funding source

The sponsor of the study had no role in the study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

Table 1 shows the different categories of health workers providing care in every country, the duration of their preservice training, and the number of children that they saw. In Bangladesh, children were seen by medical assistants and subassistant community medical officers, both of whom received 4 years of post-secondary training, and by family welfare visitors, who received 18 months of post-secondary training. Physicians did not manage sick children in the first-level facilities who were enrolled in the Bangladesh study site. In Brazil, IMCI was provided by doctors and nurses who received 6 and 4 years of university training, respectively. In Tanzania, children were managed by clinical officers and assistant clinical officers (who received 2–4 years of post-secondary training), as well as by maternal and child health aides (2 years of post-primary school training) and nurse assistants (1 year of post-primary school training). In Uganda, clinical officers (3 years of post-secondary training), nurses and midwives (18–36 months of post-secondary training), and nurse assistants (3 months of post-primary training) accounted for almost all IMCI care provision, which was complemented by physicians (5 years of university training) and other IMCI-trained health workers.

Table 2 shows the clinical performance of IMCI-trained health workers by type, grouped by duration and level of preservice training. In Brazil, nurses did better than doctors did in the assessment and management of sick children, whereas they both had much the same performance in the correct classification indicator (table 2). In Uganda, health workers with shorter duration of training did better in correct management than did those with longer duration of training, but both categories showed levels of performance that were well below those reported from the other countries (table 2). In Bangladesh, health workers with shorter duration of training did as

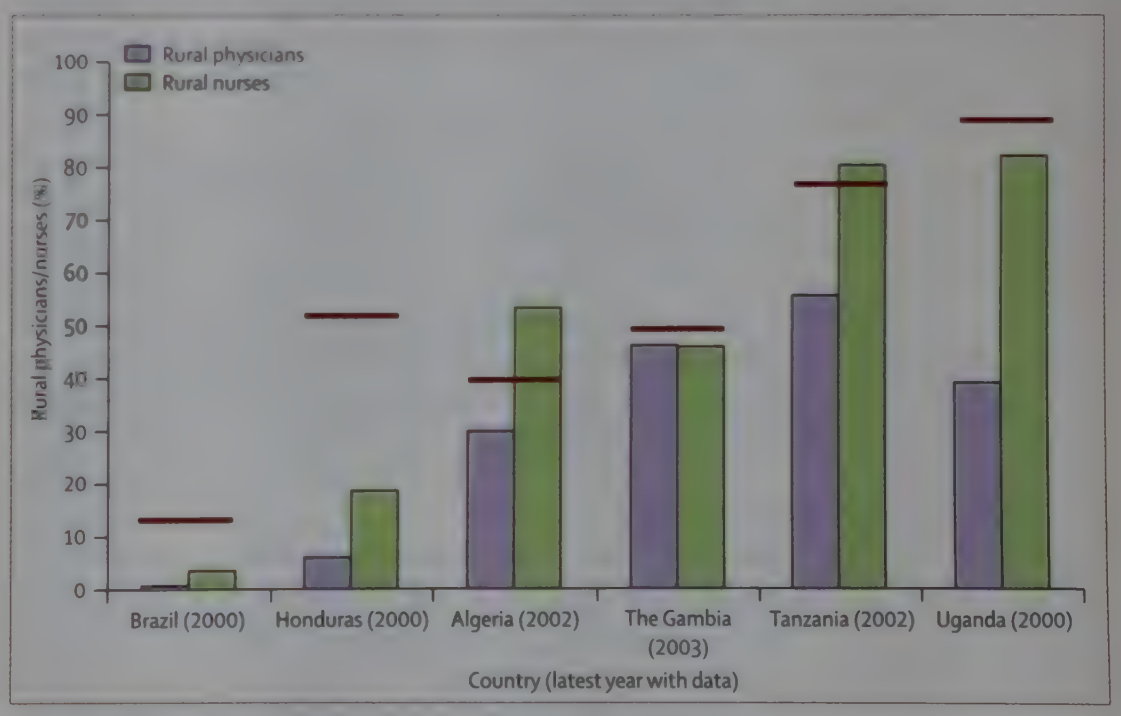

Figure 1: **Proportion of total physicians and nurses working in rural areas**
The red bars indicate the proportion of the population in rural areas in 2000. Data from reference 29.

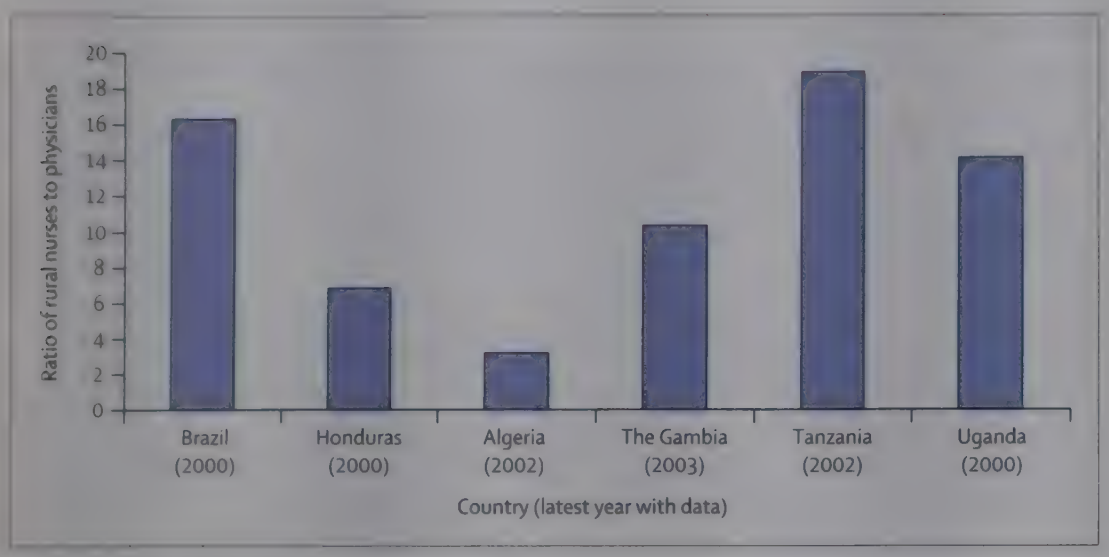

Figure 2: **Ratio of nurses to physicians in rural areas**
Data from reference 26.

	Mortality rate in children <5 years (per 1000 livebirths)	Number of child deaths since 2000 (rank)	Nurses per 1000 population (year)	Midwives per 1000 population (year)	Physicians per 1000 population (year)	Percentage of human resource threshold achieved
Bangladesh	77	343 000 (7)	0·14 (2004)	0·18 (2004)	0·26 (2004)	25%
Tanzania	126	223 000 (9)	0·30 (2002)	0·07 (2002)	0·02 (2002)	17%
Uganda	138	145 000 (14)	0·55 (2004)	0·16 (2004)	0·08 (2004)	34%
Brazil	34	127 000 (17)	3·84 (2000)	NA	1·15 (2000)	217%

Data are from references 1, 4, and 26. NA=not available.

Table 5: **Ratio of physicians and nurses, and ranking of child deaths in the four study countries**

well as did those with longer duration in all clinical tasks (table 2). In Tanzania, health workers with longer duration of training did better than did those with shorter duration of training in integrated assessment of sick children, but we recorded no difference in clinical performance in all the other clinical tasks that were assessed (table 2).

Tables 3 and 4 show the comparison of performance after adjustment for confounding factors. The statistical significance of the associations was similar to that in the unadjusted analysis (data not shown).

We analysed data for Uganda and Bangladesh both taking the clustering into effect and ignoring the clustering, and results turned out to be very similar, except that variance was greater when clustering was considered, as expected (data not shown). All significant associations remained significant in Uganda (in Bangladesh no significant associations were reported with either approach).

Discussion

Recent interest in the human resources crisis in the health sector in low-income countries[4,5] motivated this reanalysis of data collected between 2000 and 2003 in the multicountry assessment of IMCI. Previous reports from this study showed that quality of care—defined as compliance with the IMCI guidelines for assessment, classification, and management of sick children—was consistently better in areas with IMCI than in comparison areas in the four countries studied.[12,15,18,19] This study expands that evidence base by showing that the quality of care provided by health workers who received in-service IMCI training did not differ systematically between those with longer and shorter duration of preservice training. Three different outcomes—correct assessment, classification, and management—were studied in four countries. Only one of these 12 comparisons showed a significant benefit with workers who were trained for a longer time (correct assessment in Tanzania), whereas two showed a benefit with workers who were trained for a shorter time (correct management in Uganda and Brazil). The other nine comparisons showed no significant differences after adjustment for confounders. Even though the training categories are not consistent across countries because of the differences between health workforces, the overall finding is consistent with little effect of duration and level of preservice training on the quality of IMCI care.

We can provide some possible explanations for our results. First, the IMCI training modules could be sufficiently comprehensive and easy to understand for health workers, irrespective of their previous duration and level of training. Second, in previous reports, longer training was associated with a greater caseload and thus shorter time per visit,[21] implying that the amount of time that health workers with less training spend with children younger than 5 years is higher than that of their colleagues who have been trained for longer. This tenet was confirmed in additional analyses of our datasets from Bangladesh and Tanzania (Adam T, Alliance for Health Policy and Systems Research, Geneva, Switzerland, personal communication). Good quality of care might simply mean spending sufficient time on case management of children—an as yet unchallenged hypothesis.[22]

These results have to be interpreted with some caution. Because the study was restricted to first-level health facilities, very few children had serious illnesses (the proportion of children needing referral ranged from <1% in Brazil to 13% in Uganda). Doctors are likely to do better than are other health personnel when managing severe cases, although recent evidence shows that even children with severe pneumonia can be managed safely at first-level facilities.[23] Conversely, health workers with shorter duration of training might be more willing to comply with standard clinical guidelines than might those who have longer duration of training, who might use different assessment and classification strategies and yet manage children correctly. However, that staff with longer and shorter duration of training performed much the same in terms of the correct management indicator suggests that in-service IMCI training could have offset eventual differences between types of health workers in the management at primary facility level.

In Brazil, nurses did better than did doctors in correct management, including counselling tasks on how to administer the drug at home. Doctors might leave this task to clerks who dispense drugs in the facilities, thus failing to meet one of the criteria for correct management. Additionally, the Brazilian nurses also did better than their physician colleagues did in correct assessment. The Brazilian health system is much more sophisticated than that of Bangladesh, Tanzania, or Uganda—Brazilian nurses receive equal or longer duration of training than do most health workers who were classified in the group with longer training in the other three countries. That we recorded no systematic advantages of longer training, despite these differences in the composition of categories that we investigated, strengthens the external validity of our overall conclusions.

One of the limitations of the study is its observational design. However, randomly allocating trainees into becoming nurses or doctors, for example, is challenging both ethically and practically. The finding that the performance of health workers with shorter training was similar to that of those with longer training is in contrast with this potential selection bias. Furthermore, characteristics of workers that might affect the clinical performance—such as tenure and age of worker—could be important, but data for these variables were not available.

Our results need to be interpreted within a broader conceptual framework of factors affecting clinical performance, including the availability of equipment and supplies, supportive supervision, workforce motivation, economic incentives, and a positive personal and professional environment.[3,24] In the sites that were included in the present analyses, equipment and drug availability were mostly adequate, but supervision tended to be irregular.[9] However, we did not gather information about motivation, incentives, or quality of the professional environment.

Although the ratio of physicians and paramedical workers varies enormously from country to country,[5,25] nurses and other health workers tend to consistently outnumber doctors.[26] Within countries, ratios are generally highest in urban areas, particularly for physicians.[27] In rural areas, where health-care needs are greatest, the numbers of health workers, particularly doctors, tend to be much less than population needs in most countries (figure 1).[28,29] At the same time, the nurse to physician ratio in rural areas varies between 3 and 19, indicating a greater availability of nurses in rural areas than in urban areas, even in countries where less than half of their physician and nurse workforce reside in rural areas (figure 2). The differential distribution of doctors and nurses in figure 2 indicates that in underserved, rural areas, health workers with longer preservice training (such as doctors) are less available than are those with shorter training (such as nurses). Table 5 shows the ratio of physicians and nurses, and ranking of child deaths in the four study countries.

In some countries, existing regulations preclude health workers with shorter duration of training from undertaking tasks that they might appropriately do.[25] For example, in Brazil, pressure from medical societies led to discontinuation of IMCI training for nurses in 2002. In view of the health workforce crisis affecting underserved areas, these are regrettable measures that are further challenged by results from our study. However, in other countries—eg, Ghana, Malawi, Tanzania, and Zambia—nurses were trained and allowed to undertake tasks that were usually restricted to physicians, thus providing support for task shifting practices long before the term was accepted.[30] These analyses drew attention to the importance of proper regulation, supervision, and motivation to allow task shifting to succeed.[30]

Achievement of high and effective population coverage is a key component in the efforts to reach a measurable effect with child-health interventions.[31] As argued by Friedman[32] in the context of caesarean sections, a substantial increase in coverage with health workers with shorter training—even if they are less skilled in operative deliveries than are those with longer duration of training—can contribute to an important reduction in maternal mortality. A similar argument can be made for the reduction of deaths in children younger than 5 years, in view of the published work showing that case management of specific infections by community health workers with short training is safe and effective.[33,34]

Our results support the principle of task shifting as an important component of the strategy for strengthening health systems in areas that are understaffed. Training and deployment of motivated health workers with shorter duration of preservice training in regions with high mortality in children younger than 5 years will help ensure that all children who need clinical care are seen by a qualified provider.

Contributors

LH, RWS, and CGV participated in the article conception, writing, and discussion. LH analysed the data. AMN took part in the writing and discussion of the article. All authors saw and approved the final version of the report.

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Conflict of interest statement

Only one of the authors is a nurse (AMN), who should be expected to promote the interests of her profession. LH, RWS, CGV declare that they have no conflict of interest.

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Alma-Ata: Rebirth and Revision 1

Alma-Ata 30 years on: revolutionary, relevant, and time to revitalise

Joy E Lawn, Jon Rohde, Susan Rifkin, Miriam Were, Vinod K Paul, Mickey Chopra

In this paper, we revisit the revolutionary principles—equity, social justice, and health for all; community participation; health promotion; appropriate use of resources; and intersectoral action—raised by the 1978 Alma-Ata Declaration, a historic event for health and primary health care. Old health challenges remain and new priorities have emerged (eg, HIV/AIDS, chronic diseases, and mental health), ensuring that the tenets of Alma-Ata remain relevant. We examine 30 years of changes in global policy to identify the lessons learned that are of relevance today, particularly for accelerated scale-up of primary health-care services necessary to achieve the Millennium Development Goals, the modern iteration of the "health for all" goals. Health has moved from under-investment, to single disease focus, and now to increased funding and multiple new initiatives. For primary health care, the debate of the past two decades focused on selective (or vertical) versus comprehensive (horizontal) delivery, but is now shifting towards combining the strengths of both approaches in health systems. Debates of community versus facility-based health care are starting to shift towards building integrated health systems. Achievement of high and equitable coverage of integrated primary health-care services requires consistent political and financial commitment, incremental implementation based on local epidemiology, use of data to direct priorities and assess progress, especially at district level, and effective linkages with communities and non-health sectors. Community participation and intersectoral engagement seem to be the weakest strands in primary health care. Burgeoning task lists for primary health-care workers require long-term human resource planning and better training and supportive supervision. Essential drugs policies have made an important contribution to primary health care, but other appropriate technology lags behind. Revitalisng Alma-Ata and learning from three decades of experience is crucial to reach the ambitious goal of health for all in all countries, both rich and poor.

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See **Editorial** page 863

This is the first in a **Series** of eight papers about Alma-Ata: rebirth and revision

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Alma-Ata's 30th anniversary

This special issue of *The Lancet* marks the 30th anniversary of the Alma-Ata Declaration (panel 1).[1] 2008 has witnessed a plethora of events to mark the occasion, ranging from conferences[2] to reports[3] to special issues of journals like this one. Is this a reflection of sentimental nostalgia for a remarkable event, and equally remarkable leadership? Or is this a relevant inquiry at a critical time in the development of equitable and affordable health systems? What can we learn from what worked and what did not work, what has been sustained and what has not? Many of the health challenges we face today, both in rich and poor countries, echo those that led to the meeting in Alma-Ata. Demographic and epidemiological transitions have strained health systems as new diseases have emerged, while the old remain. Concerns about the affordability of health care, with an ever expanding menu of newer drugs and procedures, are near universal, whether driven by the demands of an ageing population and increasing chronic diseases, by the persistence of infectious diseases and maternal, newborn, and child health conditions, or by challenges that have emerged since 1978, such as HIV/AIDS. The current crisis in health, with increasing demand, rising costs, and a return towards curative and hospital care, makes re-exploration of the Alma-Ata principles timely and relevant.

The recent interest in reinvigorating comprehensive primary health care, renewed recognition of the importance of community ownership, including expanded use of mid-level and community health workers,[4] and a growing recognition of the social determinants to health and the multisectoral response required, are indicative of the ongoing relevance of Alma-Ata.[5] Shifts in global health in recent years are as revolutionary as those at the time of Alma-Ata. Today's Millennium Development Goals (MDGs), with three explicit health-related goals—for child survival (MDG 4), maternal health (MDG 5), and HIV, tuberculosis, and malaria (MDG 6)—are garnering a more cohesive commitment than their predecessor goals: the less clearly defined Alma-Ata challenge of health for all by the year 2000, and the ambitious remit of the 26 goals of the 1990 World Summit for Children. Technical agreement has advanced around what to do to improve survival in the poorest countries, catalysed in part by a number of *Lancet* Series,[6–9] but how to achieve these improvements remains a challenge.

Here, we review 30 years of policy shifts in primary health care in the global context, with a particular focus on maternal, newborn, and child health. Today, there is greater commitment and resources for global health. However, as evidenced over the past 30 years, global commitment does not necessarily translate into sustainable health improvements or to lives saved, especially among the poor. Were the comprehensive aspirations of Alma-Ata unrealistic, and what can we learn for the scale-up of universal care now? Are there key components of primary health care that were wrong, or did they fail from neglect? Do we have the evidence

required to guide priorities, and to measure and sustain progress to make a second primary health-care revolution work? A number of papers in this special issue tackle dimensions of progress and change in more detail. Country progress is the real test—have deaths been reduced? Has health been improved? How equitable are primary health-care services?[10]

Alma-Ata: revisiting the vision of health for all

The context of the Alma-Ata Declaration was remarkable, pulling together high level leaders of east, west, north, and south, and of UN agencies which traditionally worked inadequately together. The meeting of health ministers and their advisers took place in a city in what is now Kazakhstan and necessitated the building of a new

***Panel 1*: Declaration of Alma-Ata International Conference on Primary Health Care, Alma-Ata, USSR, September, 1978**

I The conference strongly reaffirms that health is a fundamental human right and that the attainment of the highest possible level of health requires the action of many other social and economic sectors in addition to the health sector.

II The existing gross inequality in the health status of the people is politically, socially, and economically unacceptable.

III Economic and social development is of basic importance to the fullest attainment of health and the health of the people is essential to sustained economic and social development and contributes to a better quality of life and to world peace.

IV The people have the right and duty to participate individually and collectively in the planning and implementation of their health care.

V Governments have a responsibility for the health of their people. Primary health care is the key to attaining this target as part of development in the spirit of social justice.

VI Primary health care is essential health care based on practical, scientifically sound, and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family, and community with the national health system, bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health-care process.

VII Primary health care: (1) reflects and evolves from the economic conditions and sociocultural and political characteristics of the country and its communities and is based on the application of the relevant results of social, biomedical, and health services research and public health experience; (2) addresses the main health problems in the community, providing promotive, preventive, curative, and rehabilitative services accordingly; (3) includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunisation against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs; (4) involves, in addition to the health sector, all related sectors and aspects of national and community development, in particular agriculture, animal husbandry, food, industry, education, housing, public works, communications, and other sectors; and demands the coordinated efforts of all those sectors; (5) requires and promotes maximum community and individual self-reliance and participation in the planning, organisation, operation, and control of primary health care, making fullest use of local, national, and other available resources; and to this end develops through appropriate education the ability of communities to participate; (6) should be sustained by integrated, functional, and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need; (7) relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries, and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community.

VIII All governments should launch and sustain primary health care as part of a comprehensive national health system in coordination with other sectors.

IX All countries should cooperate in a spirit of partnership and service to ensure primary health care for all people since the attainment of health by people in any one country directly concerns and benefits every other country.

X An acceptable level of health for all the people of the world by the year 2000 can be attained through a fuller and better use of the world's resources, a considerable part of which is now spent on armaments and military conflicts. A genuine policy of independence, peace, détente, and disarmament could and should release additional resources that could well be devoted to peaceful aims and in particular to the acceleration of social and economic development of which primary health care, as an essential part, should be allotted its proper share.

Abridged from reference 1.

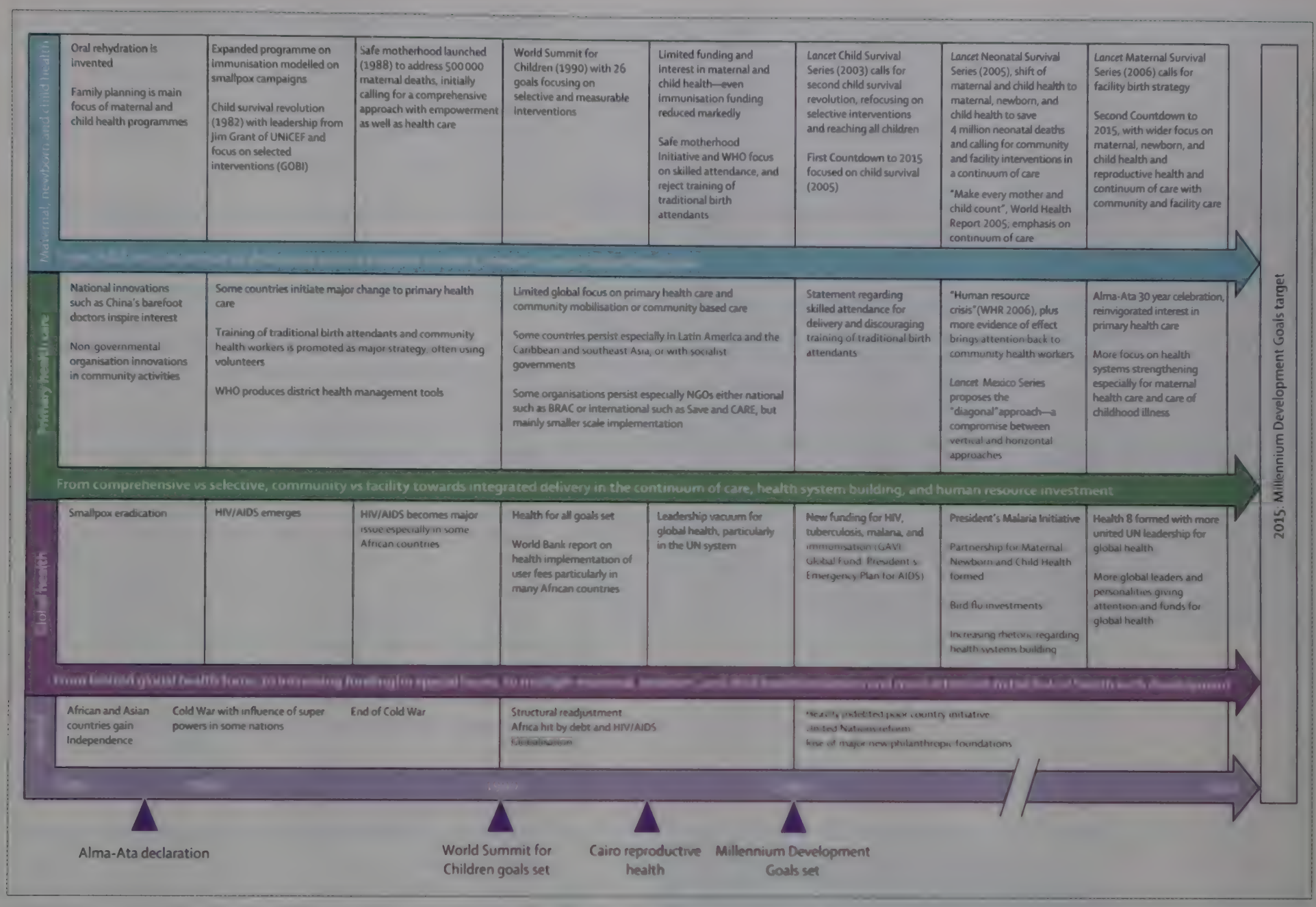
Maternal, newborn and child health
Oral rehydration is invented
Family planning is main focus of maternal and child health programmes
Expanded programme on immunisation modelled on smallpox campaigns
Child survival revolution (1982) with leadership from Jim Grant of UNICEF and focus on selected interventions (GOBI)
Safe motherhood launched (1988) to address 500 000 maternal deaths, initially calling for a comprehensive approach with empowerment as well as health care
World Summit for Children (1990) with 26 goals focusing on selective and measurable interventions
Limited funding and interest in maternal and child health—even immunisation funding reduced markedly
Safe motherhood Initiative and WHO focus on skilled attendance, and reject training of traditional birth attendants
Lancet Child Survival Series (2003) calls for second child survival revolution, refocusing on selective interventions and reaching all children
First Countdown to 2015 focused on child survival (2005)
Lancet Neonatal Survival Series (2005), shift of maternal and child health to maternal, newborn, and child health to save 4 million neonatal deaths and calling for community and facility interventions in a continuum of care
"Make every mother and child count", World Health Report 2005; emphasis on continuum of care
Lancet Maternal Survival Series (2006) calls for facility birth strategy
Second Countdown to 2015, with wider focus on maternal, newborn, and child health and reproductive health and continuum of care with community and facility care
Primary health care
National innovations such as China's barefoot doctors inspire interest
Non-governmental organisation innovations in community activities
Some countries initiate major change to primary health care
Training of traditional birth attendants and community health workers is promoted as major strategy, often using volunteers
WHO produces district health management tools
Limited global focus on primary health care and community mobilisation or community based care
Some countries persist especially in Latin America and the Caribbean and southeast Asia, or with socialist governments
Some organisations persist especially NGOs either national such as BRAC or international such as Save and CARE, but mainly smaller scale implementation
Statement regarding skilled attendance for delivery and discouraging training of traditional birth attendants
"Human resource crisis"(WHR 2006), plus more evidence of effect brings attention back to community health workers
Lancet Mexico Series proposes the "diagonal" approach—a compromise between vertical and horizontal approaches
Alma-Ata 30 year celebration, reinvigorated interest in primary health care
More focus on health systems strengthening especially for maternal health care and care of childhood illness
From comprehensive vs selective, community vs facility towards integrated delivery in the continuum of care, health system building, and human resource investment
Global health
Smallpox eradication
HIV/AIDS emerges
HIV/AIDS becomes major issue especially in some African countries
Health for all goals set
World Bank report on health implementation of user fees particularly in many African countries
Leadership vacuum for global health, particularly in the UN system
New funding for HIV, tuberculosis, malaria, and immunisation (GAVI Global Fund President's Emergency Plan for AIDS)
President's Malaria Initiative
Partnership for Maternal Newborn and Child Health formed
Bird flu investments
Increasing rhetoric regarding health systems building
Health 8 formed with more united UN leadership for global health
More global leaders and personalities giving attention and funds for global health
2015: Millennium Development Goals target
African and Asian countries gain Independence
Cold War with influence of super powers in some nations
End of Cold War
Structural readjustment
Africa hit by debt and HIV/AIDS
Globalisation
Alma-Ata declaration
World Summit for Children goals set
Cairo reproductive health
Millennium Development Goals set

Figure 1: **30 years since Alma-Ata—the shifts towards integration for global health, primary health care, and maternal, newborn, and child health**

hotel to house delegates and the chartering of planes to fly in most participants. But even more remarkable than the context was the content of the Declaration. Although billed as a primary health-care revolution, the content was much wider—a comprehensive philosophy for development (panel 1). It presented a shift in thinking that saw health not merely as a result of biomedical interventions but also an outcome of social determinants. Motivated by the call for social justice, Alma-Ata identified the key principles of equity and community participation supported by health promotion, intersectoral collaboration, and appropriate use of resources. According to Halfdan Mahler, WHO's Director at the time, Alma-Ata was "one of the rare occasions where a sublime consensus between the haves and the have-nots in local and global health emerged".[14]

Alma-Ata's definition of health was based on WHO's constitutional definition, where health is "a state of physical, mental and spiritual well-being, not merely an absence of disease or infirmity"[12]—a highly aspirational rather than measurable objective. Primary health care was defined as "the first level contact of individuals, the family, and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process".[1]

There was a shift in attitude from a focus on ill health and hospitals, to a focus on communities and families controlling their own health, putting the "public" into public health. The very idea of health for all energised workers and fuelled new efforts in many countries to improve service coverage, especially for previously underserved communities. The inherent focus on equity, the necessity of reaching the unreached and involving them not only in the benefits of health care, but more importantly, in the decisions and actions that collectively make health, was at once novel and revolutionary. Thus, the precepts of social justice became an integral part of health planning.

The creation and acceptance of the Alma-Ata Declaration was influenced by a range of successful health projects run by non-governmental organisations, embedded in the community and responding to expressed and objective health needs and overall development,

especially of the poor.[13] By definition, it relied on innovative approaches to health-care delivery, with care provided by community workers, and with an emphasis on prevention and the underlying determinants of health such as the environment, agriculture, education, and livelihoods. Up to that point only China, with its barefoot doctors supported by communes and work brigades, public housing, education, and other social benefits had demonstrated success on a national scale. For a major international declaration to be based on such limited experience was revolutionary.

Panel 2: The child survival revolution: selective primary health care with wide political ownership, but variable sustainability

James Grant took over the leadership of UNICEF in 1980 and sought a limited set of interventions with quantified predictable outcome that could reach all children. Universal coverage was the key concept, based on Alma-Ata. At a meeting in 1982, malnutrition, diarrhoea, and immunisable diseases were identified as major killers of children for which affordable and effective interventions were available but at low coverage. GOBI—growth monitoring, oral rehydration, breastfeeding, and immunisation—was born, initiating the child survival revolution, analogous to the green revolution that had increased food production in south Asia. Grant envisaged adding other interventions once success was achieved with these selected high impact programmes, reaching comprehensive primary health care through incremental expansion of the range of interventions. Although this progression did not work in all countries, some did succeed, most notably in Latin America. Indeed, even within GOBI, most of the focus was on oral rehydration and immunisation, since these were affordable, had predictable outcome and were trackable.

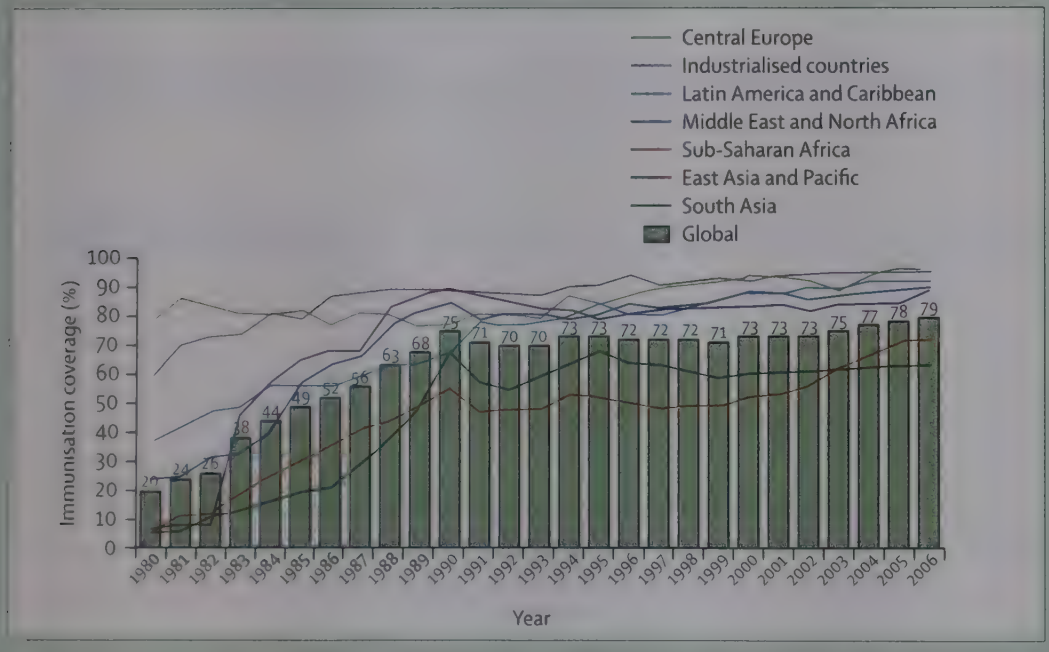

Figure 2: **Global average trends for immunisation coverage with three injections of diphtheria, pertussis, and tetanus, 1980–2006**
Data from UNICEF (http://www.childinfo.org).

By the late 1980s, the push for universal immunisation became the major focus of child survival, and global coverage of three immunisations with diphtheria, pertussis, and tetanus (DPT3) rose from 20% to 75% in just 10 years (figure 2). The World Summit for Children in September, 1990, was the first ever gathering of world leaders for a common cause. This summit was encapsulated in 26 one-line goals designed to fall within the political lifetime of the heads of state who were signing the declaration. National plans of action were to establish mid-decade goals, 5 years on, by which leaders could be judged. Eventually this extended to annual or biannual reports on progress to regional heads of state meetings. For most regions, the state of children became a standing agenda item on their Summit, and for many, a source of pride. "Keeping the promises to children" was the accountability message led by Grant and others and enhanced by UNICEF's annual State of the World's Children Report and later, by country ranking in the annual Progress of Nations assessment.

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30 years of changes in policy affecting primary health care

The Declaration was a turning point, but what progress has been made since? To understand the successes and failures for primary health care since Alma-Ata requires an appreciation of the broader changes in global health, which in turn often reflected global politics. From the comprehensive approach set out in 1978, the challenges of such a wide and truly community-based agenda quickly led to a series of dichotomies, with parallel tracks, or at times competing agendas and major shifts between priorities and proposed approaches to scaling up. An understanding of some of these major global shifts in development and health policy is essential to understand progress within countries. Figure 1 summarises the past 30 years of transitions at three levels: (1) global politics and international health; (2) primary health care; and (3) maternal, newborn, and child health, showing the transition from dichotomies back towards a more comprehensive approach at all three levels.

Global health priorities: the challenges of linking health and development

In the two decades after Alma-Ata, the global political climate cooled (figure 1). Indeed, the Cold War has been linked to stifling momentum for Alma-Ata. At the same time global development policy was dominated by neoliberal macroeconomic and social policies. For many of the poorest countries, especially in Africa, these policies manifested as structural adjustment programmes that sought to reduce budget deficits through devaluations of the local currency and cuts to public spending in all sectors, including health, education, and transport. Structural adjustment resulted in phased removal of subsidies, enforcement of cost recovery in the health sector, and rationalisation of public sector employment, with caps on the numbers of nurses and doctors that could be hired. There is evidence that these policies adversely affected the performance of health systems in terms of supply, with chronic underfunding of infrastructure and public health, reductions in the number and quality of health personnel, and worsening access to health care for the poor.[14,15] Even China retreated from its socialist policies, with privatisation of the communes and factories and barefoot doctors funded through private fee-paying clients, often leaving the poor to fend for themselves.

The World Development Report 1993[16] was influential in shifting focus back to the link between health and development, promoting the rational selection of

cost-effective sets of interventions, encouraging increased government spending in health and greater private sector involvement. However, the report focused on a narrow aspect of health service delivery that omitted the use of the term primary health care and neglected the role of other sectors and communities. These wider themes were included and further developed by the Commission for Macroeconomics and Health in 2001,[17] helping to generate major investments in HIV/AIDS, tuberculosis, and malaria which were recognised as threats to not only health, but also development and security.

Primary health care: tensions between comprehensive and selective primary health care

Alma-Ata stated that a comprehensive primary health-care system "addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly". The term primary care was used to describe first-line health services, while the term primary health care was used to describe a wider construct of social justice based on the Alma-Ata philosophy.[18] This vision catalysed a swing from emphasis on large teaching hospitals being built in many newly independent countries, towards more emphasis on preventive health, training of multipurpose paramedical workers, and training of community-based workers.[4]

The essence of Alma-Ata was a vision for preventive and curative interventions as well as increased social wellbeing, the comprehensive process of local community involvement, and improving health and the social environment through effective intersectoral action. The process, however, was challenging and variably implemented.[19,20] Guidance was provided regarding the principles of bringing care closer to homes, ensuring referral links were functional between communities and facilities, and the provision of essential drugs, but the priority setting and implementation processes were left to the local level. Some manuals were produced, particularly around community diagnosis, district health management, and training of community health workers and traditional birth attendants, but in most cases the scaling-up process was left to each country or, in more decentralised countries, to each region or district.[18,19] In countries undergoing socialist restructuring—eg, Tanzania, Nicaragua, Eritrea, and Cuba—the community process and social reform was often more extensive and sustained.

However, within a year of the Declaration, an influential paper proposed that a simpler approach was required, involving the selection of the few interventions most justified by epidemiological importance and technological affordability, and a more top-down management approach.[21] Given the daunting array of health demands and the limitations of both workers and finances, this more selective approach was considered to be more feasible, measurable, rapid, and less risky than really empowering communities to make choices. Funding agencies found this focus particularly attractive, since it enabled training, logistics support, management, and supervisory systems to achieve results that could be measured. Preventive activities that focused on the delivery of discrete items were the most likely to be selected, particularly family planning, immunisation, endemic disease control, and nutrition. These interventions were often delivered through "vertical" programmes, taking the decisions out of the hands of communities, but rapidly reaching high coverage, at least for some selected priorities, most notably family planning and immunisation. One well-known example of the selective primary health-care approach is the child survival revolution, championed by Jim Grant,[22] who became director of UNICEF soon after Alma-Ata (panel 2). This provided many lessons to be learned for today's global initiatives, notably the power of consistent leadership both globally and from national governments, and the need for data and results to drive action.

This debate—between comprehensive and selective, horizontal and vertical, top-down and bottom-up—was the major topic of discussion in global health for the 1980s and 1990s, with few programmes or agencies bridging the gap. Most policy analysts and funding agencies saw this as an either/or choice. Indeed, some analysts suggest the debate between comprehensive and selective was a WHO and UNICEF dispute.[23] A notable feature of the debate was the almost complete lack of evidence from evaluations of the different approaches. Table 1 summarises these inherent tensions.

However, since 2000 there has been a shift to combine the strengths of both approaches, and indeed, to use selective programmes to gradually strengthen health systems to be able to deliver more comprehensive care. So, for example, child health days, which began as an important campaign outreach approach to reach rural or other marginalised families with polio immunisation, have now expanded in many countries to include other immunisations, nutritional interventions such as

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However, during the 1990s, the child survival revolution faltered and not only did commitment wane but focus on results was lost, as evidenced by sliding coverage for immunisation, with the global average for DPT3 falling back to 71% by 1999. There were many reasons for this including: loss of leadership at the global level, with Jim Grant no longer leading UNICEF; lack of data tracking and less public use of data for management; limited civil society ownership; and the leaving of the poor behind.

However, despite these losses, the child survival revolution set a strong foundation that is still the cornerstone for current global and national immunisation programmes, and for the success of GAVI Alliance in re-invigorating investment and seeing a second wave of increasing immunisation coverage. Some of the national programmes started in the 1980s with a focus on GOBI have progressed to a comprehensive health system (eg, Thailand, Malaysia, Mexico), although in other countries (eg, Bangladesh) the intervention range has remained limited or in some cases not been sustained at all, and even immunisation coverage remains low (eg, Nigeria).[10]

	Comprehensive primary health care	Selective, focused primary health care (categorical programmes)
Philosophy	Societal change and community ownership, differs everywhere; surveillance as an intervention; full intersectoral model; provide comprehensive, locally relevant primary health care	Selected interventions which are the same everywhere that problems are same; specific targets and use of data for management; focus primarily on supply of services
Measurement	Focus on outputs (eg, the number of community health workers trained)	Impact and outcome assessment intrinsic to success, particularly focused on immunisation coverage
Champions	Halfdan Mahler (WHO), Ransom Kuti (Nigerian ministry of health), Debabar Banerji (Jawaharlal Nehru University, India)	Jim Grant (UNICEF); Bill Foege (Task Force for Child Survival)
Examples 30 years ago	China's barefoot doctors; Latin American countries many linked to communist philosophy (eg, Cuba, Nicaragua, Honduras, Guatemala); India's rural health centres (Bhopi) and health guides (500 000 community health workers)	Growth monitoring, oral rehydration, breastfeeding, immunisation (GOBI) then shifting to GOBI plus family planning, food supplements, female education (GOBI-FFF); smallpox eradication; guinea worm eradication; tetanus elimination goals; vitamin A distribution; salt iodation
Examples now that have been sustained	Nepal's community health worker system; Malawi's health surveillance assistants; Nigeria's community health extension workers	Expanded programme of immunisation; tuberculosis direct observed therapy; Bangladesh nationwide oral rehydration therapy programme (mainly through the non-governmental organisation BRAC)
New initiatives	Indian National Rural Health Mission, and 600 000 village-based workers being trained; Ethiopia's health extension worker package with 32 000 workers being trained; Ghana's community health prevention service being scaled up	GAVI Alliance; Global Fund to Fight AIDS, Tuberculosis and Malaria; President's Malaria Initiative; PEPFAR

Table 1: **Comparison of comprehensive and selective primary health care over the past 30 years**

vitamin A and deworming, and even maternal interventions such as family planning, plus a wider scope of health messages. Likewise, countries have used a selective set of programmes, initially more focused on child health, to build a pathway to a more comprehensive health system.[10,24]

Programmatic shifts: from competition to integration within the continuum of care

There are a number of examples within primary health care of programmes related to a high burden of disease, but with inadequate attention. Here, we examine some key shifts within maternal, newborn, and child health with shifts in emphasis and at times competing agendas. Other examples that are relatively neglected include chronic diseases[25] and mental health.[26]

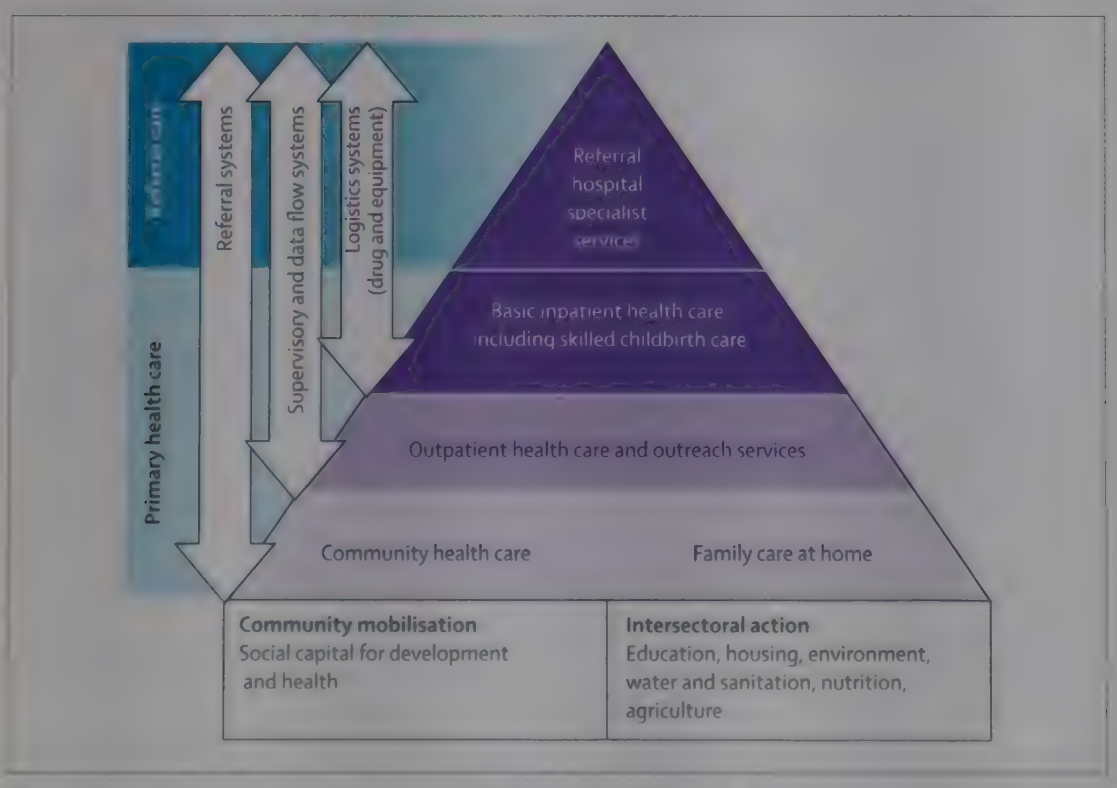
Referral systems
Supervisory and data flow systems
Logistics systems (drug and equipment)
Referral hospital specialist service
Basic inpatient health care including skilled childbirth care
Outpatient health care and outreach services
Primary health care
Community health care
Family care at home
Community mobilisation
Social capital for development and health
Intersectoral action
Education, housing, environment, water and sanitation, nutrition, agriculture

Figure 3: **Primary health care and the context of the wider health system, community mobilisation, and intersectoral action**

For much of the 1980s the focus of maternal, newborn, and child health was on selective interventions for the child. In 1988, following an influential call for action,[27] the Safe Motherhood movement was launched in Nairobi, Kenya. Given the lack of attention to the mother, the advocates for safe motherhood had a justifiable cause to fight for, but unfortunately in the ensuing conflict with child health advocates, newborn survival was neglected. More than 15 years passed before the world's 4 million newborn deaths a year came to global attention,[7] and some of the delay—despite the huge numbers of deaths—was due to competition between maternal and child health.[28,29] However, there has been a recent shift towards a lifecycle approach (figure 1) with the integration of maternal, newborn, and child health.[29–31] Adolescent health, which links child to maternal health, has also been neglected and is brought into the package through a lifecycle approach to planning.

Another dichotomy in maternal, newborn, and child health is the apparent conflict between community and facility level strategies, especially for care around childbirth. Alma-Ata emphasised the delegation of tasks and use of existing community cadres and, during the 1980s, WHO promoted the training of traditional birth attendants. In some countries, such as Malaysia, this formed a stepping stone to increase the number of births in facilities. However, in other countries, supervision and systematic linkages with the health system were missing and there was no measurable progress in reducing maternal mortality.[32] During the 1990s, there was a major

reversal in policy, with WHO and other UN agencies strongly discouraging the use of traditional birth attendants and exclusively promoting facility births with skilled attendants.[33] Although this is undoubtedly the solution of choice, this shift has left a vacuum for countries that are still reliant on traditional birth attendants that required urgent investment in generating more midwives, adapting training to shorter courses, and deploying and retaining midwives in hard to serve areas. There is also evidence to suggest that traditional birth attendants can fulfil other roles and help facilitate a transition to increased facility care.[34] Linking communities and facilities in a continuum of care is more effective in reducing maternal and newborn deaths than is focusing on either community or facility alone.[29,31]

The reality of comprehensive primary health-care services

The Alma-Ata Declaration was not a "how to" manual, but rather a philosophy of holistic health. Progress in countries and even within countries for this comprehensive approach has been variable, ranging from major reductions in mortality and fairly equitable service provision, to lost ground in some countries with natural or man-made disasters or massive AIDS epidemics.[10] Integration of common management functions for all programmes—eg, essential drugs, transport, supervision, and information—is a crucial first step to providing comprehensive care. Many countries now have fairly high coverage of schedulable interventions such as immunisation, providing a platform for the addition of more comprehensive interventions at the same visit such as nutrition, integrated management of childhood illnesses, and family planning services.

However, integration and coordination within health systems remains an important challenge with very limited empirical evidence of what works.[35,36] If quality is low or competent providers, drugs, or life-saving interventions are missing at the lowest level, then users will go straight to district or referral centres, to the private sector, or not seek services at all.[36,37]

The formation of links between community and primary health care is essential and requires clearly understood protocols that indicate when the services of one or other is required, and when patients should be referred for higher level care, as well as functional communication, referral, and supervisory systems.[38] Figure 3 provides a framework for a tiered health system, which builds on both community mobilisation and intersectoral action. The foundation and emphasis for promotion and provision of health is the family and community, and cannot be divorced from the social and intersectoral context. Massive inequities in health tend to reflect massive inequities in education, housing, and other sectors.

The content of primary health care—which interventions are included and which are priorities for universal access—has shifted over time. Bhutta and colleagues[36] examine in detail the evidence for interventions particularly for maternal, newborn, and child health. As the emphasis shifts back to comprehensive, integrated services, the complexity of tasks, associated logistics, and managerial support required is ever increasing, whether for a general practitioner in England or a health surveillance assistant in Malawi. Panel 3 summaries the main components

***Panel 3*: Summary of the main programmes and tasks within the remit of primary health-care workers and community health-care workers**

Health promotion and community mobilisation for health

- Water, sanitation, and hygiene
- Infant and young child feeding, including growth monitoring
- School health
- Food and other public-health control measures
- Dental health
- Special programme areas—HIV and tuberculosis, malaria, guinea worm, trachoma, river blindness, bilharzia

Outpatient or outreach services (often commodity dependent)

- Family planning, antenatal care, postnatal care
- Extended programmes of immunisation and polio eradication
- Specific nutritional interventions (eg, vitamin A, iron, iodine, zinc, deworming)
- HIV services (prevention activities, voluntary counselling and testing, prevention of mother-to-child transmission, provision of antiretrovirals)
- Malaria prevention (eg, bednets) and outpatient care

Case management and care (skill and some infrastructure/clinic required, with referral system)

- Childbirth care
- Essential newborn care and basic care of preterm babies
- Case management of childhood illness (diarrhoea, pneumonia, malaria, neonatal sepsis)
- Protein energy malnutrition: care and rehabilitation
- HIV/AIDS and tuberculosis
- Malaria
- Syndromic management of sexually transmitted infections
- Integrated management of adolescent and adult illness
- Chronic diseases (eg, hypertension, diabetes)
- Mental health
- Eye care (eg, cataract and others)

Health systems tasks

- Management and microplanning
- Essential drugs supply and logistics
- Data monitoring, birth registration, audits
- Transport and referral
- Financing: conditional cash transfers, issuing vouchers for health care, and revolving drug funds

now regarded as being essential primary health-care services. The challenge is especially high in African settings with AIDS,[39] tuberculosis, and malaria adding to the complexity, but often also contributing to the fragmentation of programmes.

Alma-Ata: lessons and future directions

Comprehensive primary health care was proposed as the vehicle for achieving progress, and despite 30 years of a largely dichotomised approach, there are encouraging signs at all levels of a shift towards embracing a more comprehensive menu of health intervention content and more comprehensive health system building, if not yet a major shift towards a fully participatory, comprehensive process. Table 2 summarises some lessons learned about what worked and also what did not work so well. A key success is the now foundational principle of universal access to essential health care, and at least lip service to the need for equity. The health-related MDGs have garnered wider political attention from governments and agencies, link health with development, and include some of the broader agenda for maternal and now reproductive health, for example, although no real place has yet been found for chronic diseases.[25] However, the major funding for MDGs remains focused on selective, commodity-driven components,[40] despite encouraging signs of a shift towards health system strengthening.

If one key principle of Alma-Ata has been lost more than any other, it is that of community participation. If communities rise to set priorities and act accordingly, progress may be slower but will be more sustained than that achieved with commodity-driven approaches alone. Community participation was a central principle of Alma-Ata, with health prioritisation and action to be owned and driven by communities and linked with other sectors beyond health, notably education, agriculture, and food security, as well as the environment, particularly water and sanitation. Community participation for health was a central tenet of the comprehensive primary health-care approach, although perhaps more difficult to implement than the technical elements that went more readily to scale.[41] Costello and colleagues[42] explore the role of communities and the reality of community empowerment in more detail.

Intersectoral collaboration has also been a weak strand of primary health care, largely because other sectors have their own priorities and responsibilities, and felt that health concerns were not theirs. Likewise, health personnel may forget the potential public-health gains that are possible from non-health interventions. The improved health status of countries like Sri Lanka, Cuba, Costa Rica, and Bangladesh is attributable at least as much to public works, education, agriculture, microcredit, and job creation as to health advances. National policies can facilitate such collaboration, but only local action can make these synergies happen.

Another pitfall was the concept of primary health care being scientifically sound and socially acceptable, promoting a dichotomy between science and social or

	What worked?	What did not work?
Common global vision of health for all: universality and equity	Promoted wide involvement of stakeholders in health; problem: focused on the needs of many, reaching scale; pro-poor: overcoming the inverse care law; primary care solutions: health service provision and health promotion (supply and demand); the MDGs have revitalised this common vision with intersectoral development linkages	Health for all and Summit for Children goals not country specific so some countries could achieve easily and others could never achieve; some goals were unreachable as no effective, feasible intervention (eg low birthweight reduction) so pushed the action focus to more specific, achievable interventions; very low investment except for a few specific issues (eg, some vaccine preventable conditions and even for immunisation funding fell during the 1990s); challenge of competing priorities but perhaps case not communicated clearly to the key audiences
Comprehensive action	Conceptual framework of an integrated health system with intersectoral linkages and appropriate technology and essential drugs; successes in some countries persisted with incremental implementation	Conceptual framework of comprehensive health care considered too complex—broken into dichotomies: health or development (intersectoral), vertical or horizontal delivery, coverage or quality, facility *vs* community, mother *vs* child, central *vs* decentralised; management and programme tools lacking
Community participation and ownership	Community diagnosis process, now embedded in some societies and programmes, and revitalised as community action cycle, participatory learning and action leading toward empowerment	Community ownership perceived as slower and less controllable, less measurable; very bottom up, so variable and harder to track and risk that communities may select a priority judged to be inappropriate leading to conflict with professionals rather than partnership
Community workers	Promotion of innovative delivery strategies not just the status quo (eg, delegation of tasks)	Patchy: lack of consistent supervision and linkages to existing health system, reliance on volunteerism, local cost recovery erratic and mostly for the lowest levels
Collection of data for action	Use of coverage data to drive action, especially for immunisation, leading to the development of coverage data surveys, the precursor of UNICEF's Multiple Indicator Surveys (MICS)	Focus on outputs instead of impact (eg, number of trained community health workers or trained doctors who may not be retained or may not be effective especially without supervision and functional system support)
Innovation for supplies and technology	Developed innovations: cold chain, oral rehydration solution, partogram, vitamin A capsules, salt iodation; essential drug list used in almost every low-income and middle-income country	Technology, even appropriate technology, considered a waste of money compared with other priorities, very low investment in innovative technologies for health in low-resource settings
Environment	Recognition of importance of water and sanitation to health. Some countries placed major emphasis, especially on water.	Sanitation and garbage disposal more complex than clean water and has progressed slowly, especially for the poorest countries and rural areas, so inequity has increased
Intersectoral action	Some countries convinced agriculture to take on a role in food security, occasionally even household nutrition, but this was rare	Education, agriculture, housing, public works often ignored their role in health and were ignored by health planners. The intersectoral concept is good in theory, but in practice each sector has its own agenda and major change is required for effective intersectoral collaboration

***Table 2*: 30 years after Alma-Ata, what worked and what did not?**

traditional norms. The paradigm has now shifted to take into account the context of each situation and traditional systems to avoid this unnecessary conflict. Indeed, the socially acceptable tenet also risked entrenching negative social dynamics that promote gender disparities. The focus should be on applying science and being socially transformative in the direction of improved quality of life, not just preserving the social norms at all costs.[43]

The success of primary health care depends on the interactions of families and communities with primary health-care workers. Human resources are key, not just in skill and distribution but in their relationships with communities. Throughout many countries of low or middle income, extension workers and community health workers are experiencing a renaissance, with training schemes proliferating at a rate similar to the early 1980s. Generally there is more willingness to revisit the idea of delegation of tasks using mid-level cadres and community health workers that was prevalent in Alma-Ata, and attention is being given to training and supervising human resources.[4] India has once again embarked on efforts to develop and deploy a vast cadre of village-based workers. Learning from the failures of the Health Guide Scheme of 25 years ago, this new effort emphasises linking families to the lowest levels of the formal health-care system. Throughout Africa, the power of communities has been demonstrated in programmes to combat HIV and AIDS, with volunteers forming the backbone of HIV counselling and testing; home care has also helped reduce the burden on hospitals, and overwhelmed social services are supplemented by community action for children and others devastated by the epidemic. With the ever increasing array of health service programmes, each a priority in the minds of the designers, there is a danger of overwhelming primary health-care workers with a massive menu, sometimes placed all on one cadre (panel 3). Features of effective primary care services include a mix of delegation and skills, adoption of standard management protocols, integrated information systems, and essential drug supplies.

Although the strength of community action and low level trained workers is well proven, they must not be exploited, as all too often occurred in the past.[4] Another pitfall is a lack of systematic planning and investment in supervision and on the job training. Many of these principles are lessons learned by trial and error in the decades since Alma-Ata, often despite limited attention to systematic evaluation, particularly at scale. One key lesson is the need for more careful assessment of retention, effectiveness, and costs for all cadres of health worker, including community health workers.

The district health system gained recognition as the most appropriate unit to implement primary health care in terms of management, implementation, and community dialogue, as well as integration with other sectors. Furthermore, the district with a first level hospital provided the logical interface with higher levels of the national health system, and could provide hands-on support to the constituent lower levels of care. The integrated health system vision and management are detailed in Ekman and colleagues' paper,[37] mapping a way forward for action to reinvigorate primary health care within the district health system. Successes in effective district health management have occurred, notably in Thailand and Tanzania.[10]

Health information, especially on coverage of primary health-care interventions, is improving and serves as an objective local measure of progress and as a tool for decentralised management to take appropriate and timely action to increase coverage to those most in need.[44] National and regional averages obscure the important local disparities that should lead to concerted action with communities to redress inequity in service provision. There are many lessons learned from immunisation programmes for data-driven programming (panel 2). The goal of health equity can only be addressed when timely information is available and acted upon locally.[45]

Another key tenet of Alma-Ata was appropriate drugs and technology for health. The essential drugs policy, now well established in almost every member state of WHO, has been a success story in increasing the availability of key drugs and also limiting the power of the pharmaceutical industry. Although few new drugs have been developed for high burden illnesses in poorer countries, there are some successes, notably new malaria drugs and new vaccines. The advent of communication technologies (eg, mobile phones, palm and laptop computers, internet, television) also provides many opportunities for primary health care. However, innovation for health technologies has again been left to profitability alone, rather than objectively determined health needs (table 2). There is a need for strategic prioritisation of which devices would make the most difference in resource-poor settings and for investment and innovation to make devices that are robust and easily usable.

There is still much that we do not understand about what makes for success and more detailed analysis of health system progress and associated changes in countries is an evolving science beyond the epidemiology of randomised controlled trials.[10,46] Rigorous trials are required of combinations of these interventions in various settings to measure real costs and effects on populations. Attention needs to be paid to developing and codifying change and providing indicators for process as well as outcome.

Alma-Ata: can it be revitalised?

Health for all is more possible now than 30 years ago—shifts from dichotomies towards integration for primary health care provide opportunities not envisaged before. Many of the ingredients are in place. Today, unlike after Alma-Ata, governments, donors, and even private

foundations are at least talking about working together and respecting national leadership.[47] The major health agencies, who have often acted in competition, have now formed the so-called Health 8; cooperation and coordination seems to be increasing, as evidenced by the coordinated messages for the recent G8 meeting in Japan. The overseas development funding available for maternal, newborn, and child health has gone up by two-thirds between 2003 and 2006 to a total of $3·5 billion per year,[40] in stark contrast with the lack of funding for the goals of Alma-Ata or the World Summit for Children. Funding is increasing and is also shifting from selective global funds, towards health system strengthening, in some countries through sector-wide approaches.[48] There are a plethora of management and programme guides for both community and facility rollout. More commitment and resources produce a greater potential for change but also an increased demand for accountability and measurable results. As evidenced over the past 30 years, global commitment does not equate to sustainable changes in health in individual countries, or to lives saved, especially among the poor and especially when competing agendas produce dichotomies.

In 20 years from now, at the half century of Alma-Ata, we could see a different world, with basic health care reaching many of the poorest families. However, to achieve this goal we need to revitalise the original revolutionary principles of Alma-Ata, sticking consistently to the core values of universal access for care, equity, community participation, intersectoral collaboration, and appropriate use of resources. This special issue demonstrates that health for all and primary health care are as relevant and more possible today than 30 years ago.[49] What is needed is consistent commitment to the principle of health for all, and consistent policy and action that is not fragmented. This is especially important for those underserved communities, present in every country, that have seen the least progress in the last 30 years. We believe that revitalisation of the tenets of the Alma-Ata Declaration is necessary to meet the MDGs in 2015 and beyond. Like the first primary health-care revolution, this will take champions—as Mahler said at the 2008 World Health Assembly "unless we all become partisans in renewed local and global battles for...equity...we shall indeed betray the future of our children and grandchildren."[11]

Conflict of interest statement
We declare that we have no conflict of interest.

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Alma-Ata: Rebirth and Revision 2

Supporting the delivery of cost-effective interventions in primary health-care systems in low-income and middle-income countries: an overview of systematic reviews

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See **Editorial** page 863

This is the second in a **Series** of eight papers about Alma-Ata: rebirth and revision

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Strengthening health systems is a key challenge to improving the delivery of cost-effective interventions in primary health care and achieving the vision of the Alma-Ata Declaration. Effective governance, financial and delivery arrangements within health systems, and effective implementation strategies are needed urgently in low-income and middle-income countries. This overview summarises the evidence from systematic reviews of health systems arrangements and implementation strategies, with a particular focus on evidence relevant to primary health care in such settings. Although evidence is sparse, there are several promising health systems arrangements and implementation strategies for strengthening primary health care. However, their introduction must be accompanied by rigorous evaluations. The evidence base needs urgently to be strengthened, synthesised, and taken into account in policy and practice, particularly for the benefit of those who have been excluded from the health care advances of recent decades.

Introduction

In 1978, representatives from 134 countries gathered in Alma-Ata in the former USSR and declared that primary health care, "based on practical, scientifically sound and socially acceptable methods and technology made universally accessible through people's full participation",[1] was key to delivering health for all by the year 2000. Recent years have seen a renewed interest in primary health care, particularly in low-income and middle-income countries. Reasons for this renewed interest include profound inequities in health; inadequate progress towards the Millennium Development Goals, especially in sub-Saharan Africa;[2–4] major shortfalls in the human resources needed to improve delivery of cost-effective interventions;[5,6] and the fragmented and weakened state of health systems in many countries.[7]

More generally, there have been calls to redress the balance between the now dominant vertical, disease-focused programmes and the horizontal, systems-focused perspective that underpins most approaches for primary health care.[8] The GAVI Alliance, for example, has committed US$800 million over a 5-year period to help countries overcome health system weaknesses that impede sustainable increases in immunisation coverage,[9] and the Global Fund to Fight AIDS, Tuberculosis and Malaria is also calling for integrated responses.[10]

Strengthening health systems to improve the delivery of cost-effective interventions is complicated by differing ideas of what constitutes primary health care. This is affected, in part, by financial and human resources and the underlying political and ideological perspective of different countries. The broader approach for primary health care is seen as encompassing equitable distribution, community participation, an emphasis on prevention, the use of appropriate technology, and the involvement of of a diverse range of health and other departments.[11] By contrast, narrower views of primary health care, often from high-income settings, emphasise the first contact of the patient with the health care system and focus specifically on the roles of health professionals.[12,13]

There are also differing iseas of what constitutes health systems. WHO's building blocks of health systems include leadership and governance, financing, service delivery, health workforce, medical products and technologies, and information and evidence.[14] A taxonomy of health system arrangements provides additional categorisation, distinguishing between governance

Key messages

- Financial incentives can be used to influence provider and patient behaviours, but can also have undesirable effects
- User fees reduce the use of both essential and non-essential health services. However, removal of user fees needs to be implemented with care since it can have undesirable consequences. Alternative health financing strategies have not been adequately assessed
- Task shifting, for example from doctors to nurses and from health professionals to lay providers, offers opportunities for expanding coverage and addressing human resource shortfalls
- Although multiple vertical programmes can lead to service duplication, fragmentation, and inefficiency, the effects of strategies to integrate primary health-care services have not been assessed adequately
- Quality improvement strategies, including those tailored to address identified barriers, can have important, although modest, effects on primary health-care quality

arrangements (political, economic, and administrative authority in the management of health systems),[15] financial arrangements (funding and incentive systems, as well as financing), delivery arrangements (human resources for health, as well as service delivery), and interventions (programmes, services, and technologies).[16] Most descriptions of health system elements omit the implementation strategies to support the use of cost-effective interventions.[17,18]

In this overview we summarise the evidence from systematic reviews on the effects of governance, financial and delivery arrangements, and implementation strategies that have the potential to improve the delivery of cost-effective interventions in primary health care in low-income and middle-income countries. We do not address specific clinical or public health interventions but rather the health system arrangements and implementation strategies that support their delivery in primary health care. We discuss how the available evidence relates to both the aspirations of the Alma-Ata Declaration and a taxonomy of health system arrangements (panel 1). We have also reviewed indicators of the relevance of reviews to primary health care in low-income and middle-income countries, graded the strength of evidence, and identified applicability and equity considerations.

Methods

We searched two electronic databases of systematic reviews: the Cochrane Effective Practice and Organisation of Care (EPOC) register of systematic reviews and the Program in Policy Decision-Making/Canadian Cochrane Network and Centre (PPD/CCNC) database of systematic reviews of the effects of governance, financial, and delivery arrangements. The EPOC register of systematic reviews included 1020 records as of Feb 12, 2008. These were identified through electronic searches of Medline (up to August, 2007) and the Cochrane Database of Systematic Reviews, the Database of Abstracts of Reviews of Effectiveness (DARE), and Embase (all up to October, 2006). The PPD/CCNC database was derived from the searches used to create the EPOC register and hand searching of Cochrane Database of Systematic Reviews (Issue 3, 2007). All reviews contained in the PPD/CCNC database have been coded according to a taxonomy (panel 1). The EPOC register Medline search was updated in March, 2008, and screened for additional relevant reviews. The full Medline search strategy is shown in the webappendix. Search strategies for the other databases are available on request.

For this study, we included reviews that had a methods section with explicit selection criteria, that were potentially relevant to primary health care in low-income and middle-income countries, and that assessed the effects of governance, financial or delivery arrangements, or implementation strategies. We assessed reviews ranging from research focused on primary medical care

***Panel 1:* Taxonomy of governance, financial, and delivery arrangements within health systems for primary health care (adapted from Lavis and colleagues[16])**

Governance arrangements

What are the effects of changes in or interventions to improve

- Policy authority—eg, who makes policy decisions about what primary health care encompasses (such as whether such decisions are centralised or decentralised)
- Organisational authority—eg, who owns and manages primary health-care clinics (such as whether private for-profit clinics exist)
- Commercial authority—eg, who can sell and dispense antibiotics in primary health care and how they are regulated
- Professional authority—eg, who is licenced to deliver primary health-care services; how is their scope of practice determined; and how they are accredited
- Consumer and stakeholder involvement—who from outside government is invited to participate in primary health-care policy-making processes and how are their views taken into consideration

Financial arrangements

What are the effects of changes in or interventions to improve

- Financing—eg, how revenue is raised for core primary health-care programmes and services (such as through community-based insurance schemes)
- Funding—eg, how primary health-care clinics are paid for the programmes and services they provide (such as through global budgets)
- Remuneration—eg, how primary health-care providers are remunerated (such as via capitation)
- Financial incentives—eg, whether primary health-care patients are paid to adhere to care plans
- Resource allocation—eg, whether drug formularies are used to decide which medications primary health-care patients receive for free

Delivery arrangements

What are the effects of changes in or interventions to improve

- To whom care is provided and the efforts are made to reach them (such as interventions to ensure culturally appropriate primary health care)
- By whom care is provided (such as primary health-care providers working autonomously *vs* as part of multidisciplinary teams)
- Where care is provided—eg, whether primary health care is delivered in the home or community health facilities
- With what information and communication technology is care provided—eg, whether primary health care record systems are conducive to providing continuity of care
- How the quality and safety of care is monitored—eg, whether primary health-care focused quality-monitoring systems are in place

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See **Online** for webappendix

Panel 2: Assessing the applicability to low-income and middle-income countries of the findings of included reviews

The following criteria were used to assess the applicability of the findings of included reviews to low-income and middle-income countries:

- Are there important differences in the structural elements of health systems (ie, governance, financial, and delivery arrangements) between where the research was done and where it could be applied in low-income and middle-income countries that might mean an intervention could not work in the same way?
- Are there important differences in on-the-ground realities and constraints (ie, governance, financial, and delivery arrangements) between where the research was done and where it could be applied in low-income and middle-income countries that might substantially alter the potential benefits of the intervention? And can these challenges be addressed in the short-term to medium-term?
- Are there likely to be important differences in the baseline conditions between where the research was done and where it could be applied in low-income and middle-income countries? If so, this would mean that an intervention would have different absolute effects, even if the relative effectiveness was the same
- Are there important differences in the perspectives and influences of health system stakeholders (ie, political challenges) between where the research was done and where it could be applied in low-income and middle-income countries that might mean an intervention will not be accepted or taken up in the same way? And can these challenges be addressed in the short-term to medium-term?

See Online for SUPPORT summaries

See Online for webpanel

to research focused on primary health care as envisaged in the Alma-Ata Declaration. The searches did not use a language restriction.

Two authors independently screened the abstracts included in the PPD/CCNC database to identify reviews that seemed relevant to primary health care and low-income and middle-income countries. Relevance was assessed by searching for links to low-income and middle-income countries and primary health care through the focus of the review (country/region or primary health care mentioned in the abstract or title; review question or studies included in the review focused explicitly on low-income and middle-income countries or primary health care). A second pair of authors screened the EPOC register for reviews of implementation strategies to support the delivery of cost-effective interventions (or more generally to improve the quality of care), building on a recently published overview of systematic reviews of this topic.[19] A third pair then examined independently the full text reports of both sets of reviews and selected those of highest priority for primary health care in low-income and middle-income countries. The final selection of high priority reviews for inclusion was based on a consensus of the authors.

We summarised each included review using an approach developed by the SUPPORT Collaboration.[20] Using standardised forms, we extracted data on the background of the review, the interventions, participants, settings, and outcomes, the key findings, and considerations of applicability (panel 2), equity, cost-effectiveness, and monitoring and evaluation. The quality of the evidence for the main comparisons was assessed using the GRADE approach[21] (webpanel). Each completed summary was peer-reviewed, and formed part of a larger project to summarise and make widely available the findings of reviews relevant to health systems in low-income and middle-income countries.[22]

Finally, we developed a matrix relating questions about governance, financial and delivery arrangements, and implementation strategies (panel 1) to the aspirations of the Alma-Ata Declaration. We used this matrix to summarise the available evidence from the included systematic reviews, important uncertainties, and important questions for which we could not identify a systematic review.

Role of the funding source

The funding source had no role in the overview design, data extraction, data interpretation, or writing of the report. The corresponding author had final responsibility for the decision to submit for publication.

Results

Over 20 000 references were screened to develop the EPOC and PPD/CCNC databases. By screening the abstracts, 195 of over 1000 reviews were deemed potentially relevant, and 20 systematic reviews were selected on the basis of their relevance and the feasibility of reviewing them within resource and time constraints (figure). These reviews included a total of 812 randomised controlled trials, interrupted time-series studies, and controlled before-and-after assessments, although some studies were included in more than one review.[20]

Table 1 and webtable 2 show the reviews grouped according to whether the interventions mainly assessed the effects of governance, financial or delivery arrangements for primary health-care systems, or the effects of implementation strategies, although some reviews cut across more than one category.[23–41] Most reviews (n=13) addressed delivery and financial arrangements. However, some reviews assessed similar interventions, such as educational meetings, for different health issues. We have tried to highlight where this is the case and to note any differences in findings between these reviews.

Around 16% (126) of the 812 included studies were undertaken in low-income and middle-income countries only, whereas six reviews included studies from

high-income countries only. 417 studies (51%) were done in primary care or involved a mix of primary and other health care settings. However, most of these studies were of primary medical care rather than primary health care as envisaged in the Alma-Ata Declaration. Reviews including studies from non-primary care settings focused mainly on quality improvement studies across primary and other health care settings. The reviews included in this overview also focused on outcomes associated with a range of health care providers (primary care physicians or general medical practitioners, nurses, pharmacists, and lay health workers), patients, or consumers. We interpreted the findings of the reviews taking into consideration the selection criteria they used and the contexts of the included studies (webtables 2 and 3). For most reviews there was uncertainty about the applicability of the findings (and the directness of the evidence) because of the low proportion of studies from low-income and middle-income countries.

Table 1 shows the extent to which the interventions seen in the reviews address the goals and aspirations of the Alma-Ata Declaration. Most address the provision of quality care and ways to improve coverage and access. We classified several of the interventions as attempting directly or indirectly to reduce inequalities in access to care,[23–26] but most reviews provided little data regarding equity or cost-effectiveness. We did not identify any systematic reviews of interventions to explicitly improve intersectoral action or community participation in primary health care in low-income and middle-income countries. Only one review focused on interventions to improve the referral system in primary health care.[27] Table 2 lists topics for which reviews were not identified.

Governance arrangements

One review addressed governance strategies for working with the private for-profit sector—including franchising, regulation, and accreditation—to improve the use of quality health services by people in low-income settings.[28] There was some evidence that regulation could improve the quality of pharmacy services. The review also showed that the accreditation of pharmacy outlets might have weak positive effects on the use of unregistered drugs, compared with non-accredited facilities. Franchising interventions had mixed effects on quality of care, health care behaviours, and client satisfaction. Although few studies included detailed socioeconomic data for participants, the authors of the review concluded that many of these interventions were likely to be effective in poor communities.

We did not find any systematic reviews that addressed other questions about governance arrangements for primary health care, including decentralisation of decision making, the regulation of training, or the control of corruption.

Financial arrangements

Six reviews addressed financial arrangements for health systems, focusing mainly on the financing of health services[23,28–30] and paying for performance,[31] and two of these reviews addressed the effects of user fees. The first review addressed the effects of cap and co-payment policies on drug use, health service use, health outcomes, and costs,[30] and found that these polices can reduce drug use and expenditures. However, reductions in drug use were found for both life-sustaining drugs and drugs that are important in treating chronic conditions. Although insufficient data for health outcomes were available, large decreases in the use of essential drugs are likely to have negative effects and could lead to increased use of healthcare services and, therefore, of overall spending. Policies in which people pay directly for their drugs are less likely to cause harm if only non-essential drugs are included in these policies or if there are exemptions to ensure that people receive essential health care.

See Online for webtables 1, 2, and 3

Another systematic review examined the effects on access to health services in low-income and middle-income countries of introducing, removing, or changing user fees.[23] The findings of 17 studies, mostly in primary care, indicated that increasing or introducing user fees substantially reduced health service use and that removing user fees increased service use immediately. However, the

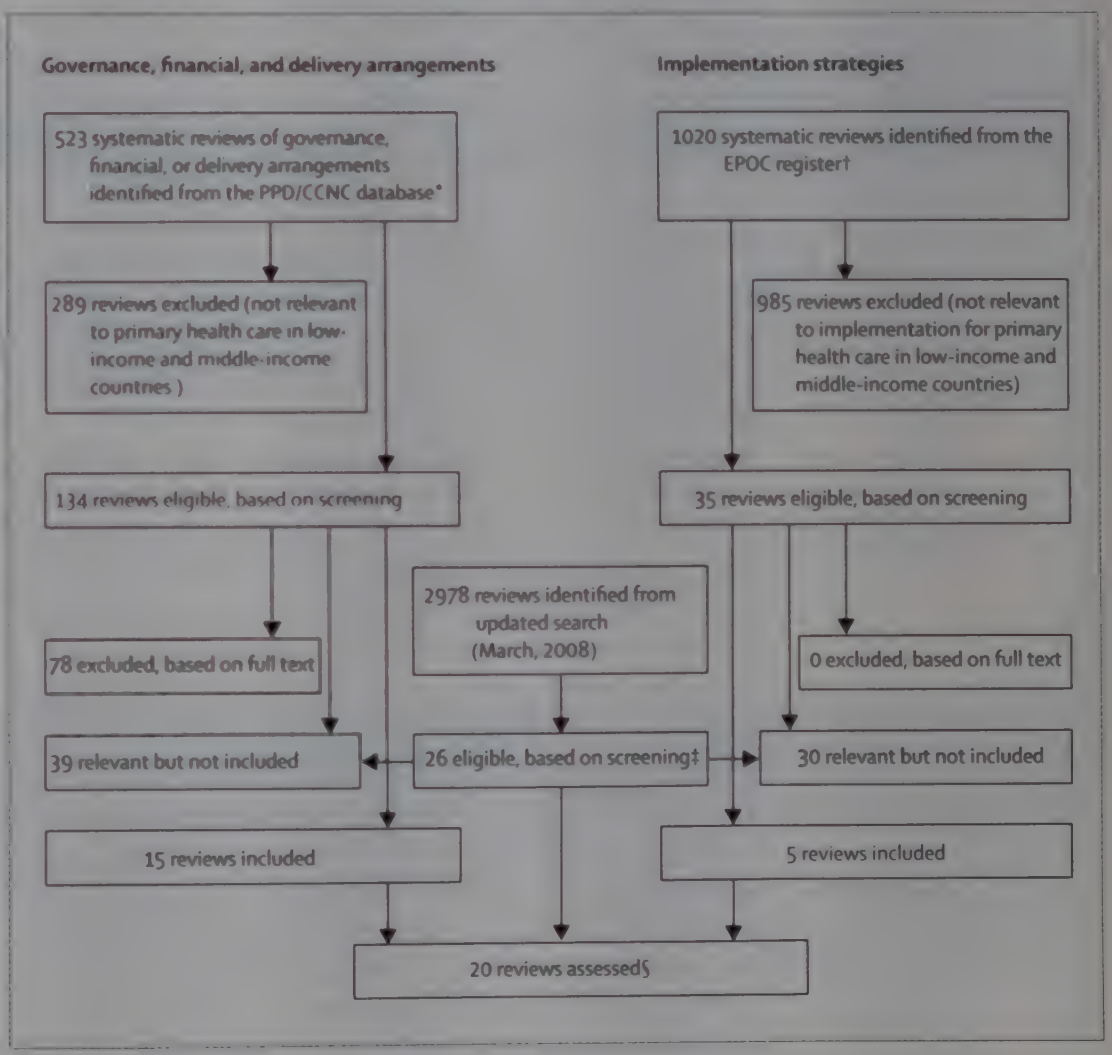
Governance, financial, and delivery arrangements
Implementation strategies
523 systematic reviews of governance, financial, or delivery arrangements identified from the PPD/CCNC database*
1020 systematic reviews identified from the EPOC register†
289 reviews excluded (not relevant to primary health care in low-income and middle-income countries)
985 reviews excluded (not relevant to implementation for primary health care in low-income and middle-income countries)
134 reviews eligible, based on screening
35 reviews eligible, based on screening
2978 reviews identified from updated search (March, 2008)
78 excluded, based on full text
0 excluded, based on full text
39 relevant but not included
26 eligible, based on screening‡
30 relevant but not included
15 reviews included
5 reviews included
20 reviews assessed§

Figure: **Flow diagram of review selection**

*Reviews from the EPOC register and the Cochrane Database of Systematic Reviews were screened. The PPD/CCNC database (http://www.researchtopolicy.ca) included a total of 684 systematic reviews; however, not all of the reviews were reviews of effects. †Over 20 000 references were screened, of which 1020 reviews were included in the EPOC register. ‡26 reviews from the updated search (15 reviews of health system arrangements and 11 reviews of implementation strategies) were relevant but not included since they were not considered high priority. Two health system reviews that had already been included were also identified by the updated search. §We included reviews that we considered to be the most relevant to primary health care in low-income and middle-income countries. Relevant but not included reviews are listed in webtable 1.

	Intersectoral action	Equity/reduce inequalities	Participation in health by consumers	Quality care	Effective care	Coverage/access	Appropriate health care, including referral systems
Governance arrangements	..	..	..	Working with for-profit providers[28]	..	..	..
Financial arrangements	.	Community-based insurance[23]	..	User fees;[23] pay-for-performance;[31] working with for-profit providers[28]	Contracting out of health services*;[37] working with for-profit providers[28]	User payments for drugs;[30] community-based insurance;[23] contracting out of health services;[3] conditional cash transfers to households[29]	
Delivery arrangements	..	Distribution of health workers;[24] specialist outreach clinics;[34] lay health workers;[25] training of traditional birth attendants[26]	Lay health workers;[25] training of traditional birth attendants[26]	..	Contracting out of health services;[37] integrating primary health care services;[33] reminders and recall for immunisation;[35] working with for-profit providers[28]	Contracting out of health services;[37] integrating primary health care services;[33] distribution of health workers;[24] specialist outreach clinics;[34] substitution of doctors by nurses;[36] lay health workers;[25] training of traditional birth attendants[26]	Outpatient referrals[27]
Implementation	..	..	..	Guideline dissemination;[38] audit and feedback;[39] educational meetings for providers;[41] educational outreach visits to providers;[40] working with for-profit providers[28]	Guideline dissemination;[38] audit and feedback;[39] educational meetings for providers;[41] educational outreach visits to providers;[40] delivery of preventive services in primary health care;[32] working with for-profit providers[28]	..	..

Row headings indicate the focus of the health systems interventions listed. Column headings indicate the goals and aspirations of the Alma-Ata Declaration. *This review could be classified under either delivery or financial arrangements, but we have placed it under delivery in this overview.

Table 1: **How the included reviews address the goals and aspirations of Alma-Ata**

removal of user fees could result in increased demands for unnecessary services, create demands that cannot be met, and further demoralise public sector providers, who might rely on these fees to supplement meager salaries or to provide additional funds for local health facilities.

A review of conditional cash transfers made directly to households, particularly to women, in low-income and middle-income countries found that these interventions were effective in increasing the use of preventive services but had mixed effects on objectively measured health outcomes.[29] Well-designed schemes tended to have positive effects but some studies showed that incentives could sometimes have adverse consequences, such as when mothers seemed to keep one of their children malnourished so they would not lose entitlement for the conditional cash transfer.[42] Overall, the evidence on conditional cash transfers was of low-to-moderate quality and was largely restricted to Latin American countries with fairly well-functioning health and social security systems.

A review of the effects of explicit financial incentives to improve health care quality found 17 studies.[31] Five of six studies found partial or positive effects of incentives directed at individual physicians. Seven of nine studies of incentives directed at provider groups reported partial or positive effects of incentives on quality measures. Most of the effect sizes were small. Two studies that assessed financial incentives at the payment system level had mixed results. Unintended effects of paying for performance included adverse selection of patients and other ways of manipulating the system to maximise payments. None of these studies were done in low-income or middle-income countries, but most were in primary care.

A review of prospective payments for health care, or risk protection mechanisms, identified only one study from low-income and middle-income countries. This review[23] indicated that community-based health insurance, compared with no insurance, can increase the uptake of primary and secondary health care for prenatal consulations and vaccination, but could reduce curative consultations per head of population. However, because the quality of the evidence was low, we cannot draw firm conclusions from these findings. Many studies of community-based health insurance are of small schemes and provide little evidence about scaling-up. No assessments of the effects of social health insurance schemes were identified by the review[23] that we summarise in this overview.

One review reported that vouchers, compared with usual practice, can be effective in increasing the uptake of goods and services, such as insecticide-treated bednets, particularly among the poorest populations.[28]

Delivery arrangements

Ten reviews addressed approaches to improving delivery arrangements for health systems.[24–28,33–37] Task shifting, "a process whereby specific tasks are moved, where

appropriate, to health workers with shorter training and fewer qualifications",[43] was the underlying concern for three reviews.[25,26,36] Traditional birth attendants are one approach to extending first-level care for pregnant women and neonates. A review of four studies from low-income and middle-income countries, which compared traditional birth attendants who received training with those who did not, found moderate-to-low quality evidence that training could reduce perinatal and neonatal deaths and stillbirths.[26] The effect on maternal mortality was unclear and there was mixed evidence on the effects on maternal morbidity, the advice given about infant feeding, and appropriate referral of complications.

Another systematic review in the area of task shifting examined 48 randomised controlled trials (RCTs) that assessed the effects of community or lay health worker interventions—programmes that use health workers who are trained in the context of the intervention but have no formal professional, certificated or degreed tertiary education—in primary health care.[25] Lay health workers show promising benefits, compared with usual care, in increasing the uptake of childhood immunisation, promoting breastfeeding, reducing childhood mortality, reducing morbidity from common childhood illnesses, and improving outcomes of tuberculosis treatment. Since around a third of the included studies were done in low-income and middle-income countries, and the findings were consistent across studies, the measured effects might be transferable across settings.

A review of 34 studies that examined the substitution of doctors working in primary care by nurse practitioners found evidence, of low-to-moderate quality, that patient outcomes and care processes were similar for nurses and doctors and that patients were more satisfied with care from nurses than from doctors.[36] Nurse practitioners also provided longer consultations, did more investigations, and were more likely to admit patients to hospital than doctors. No significant differences in costs were found, possibly due to nurses' increased use of resources or their lower productivity. There was also little evidence on whether shifting tasks from doctors to nurses reduced doctors' workload, although this seems unlikely in many low-income and middle-income settings, where demand for doctors' time greatly exceeds supply. None of the included studies were done in such countries, and differences in the training of nurses and doctors, as well as differences in working conditions, patient populations, and the organisation of primary care, could limit the

	Systematic reviews needed*	Primary research needed†
Governance arrangements	• Interventions to prevent or reduce corruption • Drug sales and dispensing policies • Public versus private not-for-profit versus private for-profit ownership and management of primary health-care facilities • Public versus private not-for-profit versus private for-profit ownership and management of health insurance plans • Decentralization of primary health-care planning	Although only one included review addressed governance, in part, there seems to be a need for developing and evaluating a wide range of interventions to improve governance arrangements
Financial arrangements	• Revenue generation mechanisms to pay for primary health care • Policies that determine who provides health insurance and who receives it • Policies that determine what primary health-care services are covered by public programmes or by insurance • Results-based financing targeted at recipients of health care, healthcare providers, and governments • Remuneration of primary health-care workers in low-income and middle-income countries • Financial and other incentives for patients	• Rigorous evaluations are needed for most of the financial arrangements addressed by the included reviews, including the reduction or elimination of user fees, risk protection mechanisms, and contracting out of health services. • Conditional cash transfers have been rigorously evaluated in Latin America, but rigorous evaluations are needed in low-income settings such as sub-Saharan Africa before expanding its use in those settings
Delivery arrangements	• Interventions to promote intersectoral collaboration at district, regional and central levels to improve primary health-care delivery and outcomes • Approaches to the organisation of referral systems • Substitution of health workers in low-income and middle-income countries, including as part of task shifting • Primary care health systems in low-income and middle-income countries • Primary care safety and quality monitoring systems	Development and rigorous evaluation of strategies to: • Improve the quality of primary health care through consumer-mediated approaches • Promote effective referral and communication across the primary–secondary care interface • Integrate primary health-care service delivery • Increase the proportion of health professionals practising in underserved communities • Implement task-shifting or substitution of health workers
Implementation strategies		• Development and evaluation of appropriate interventions to promote effective practice among primary health-care workers in low-income and middle-income countries • Development and evaluation of systems for quality improvement that are integrated into primary health-care delivery systems

*Based on key areas in the taxonomy of health systems arrangements (panel 1) for which we did not find a systematic review of the effects of alternative arrangements or policies. †We have included here only priorities for research on the effects of health system arrangements or implementation strategies that were considered in the included reviews, although there are other priorities for research outside of the areas covered by the included reviews and for addressing other types of questions.

Table 2: **Priorities for systematic reviews and primary research on supporting the delivery of effective primary health-care interventions in low-income and middle-income countries**

***Panel 3*: Key messages from systematic reviews of implementation strategies**

The use of various implementation strategies (either individually or in combination) most often achieves small-to-moderate (but important) improvements in the performance of health care providers. For example, median absolute improvements in performance for implementing clinical practice guidelines were:[38]

- 21% (range 10 to 25%) for patient-mediated interventions
- 14% (range −1 to 34%) for reminders
- 8% (range 4 to 17%) for dissemination of educational materials
- 7% (range 1 to 16%) for audit and feedback
- 6% (range −4 to 17%) for multifaceted interventions involving educational outreach visits

The effects of some interventions, such as audit and feedback, are more likely to be larger when baseline compliance to recommended practice is low and when the intervention is provided more intensively.[39]

Other factors could increase the effects of interventions. For example, for educational meetings, which are likely the most widely used implementation strategy in low-income and middle-income countries, more interactive meetings and higher attendance rates may increase their effectiveness.[41]

The effects of interventions may also depend on the targeted behaviour. For example, the effects of educational outreach visits were relatively consistent for prescribing, but varied widely for other behaviours.[40]

Tailoring interventions to address specific barriers to change in a particular setting is probably important[32] but further work on identifying, selecting, and addressing barriers to change is needed.[48]

For more on the **WHO Integrated Management of Childhood Illness** see http://www.who.int/imci-mce

applicability of the findings to such settings. Another systematic overview of the published studies drew similar conclusions.[44]

Two reviews focused on the primary–secondary care interface—a key component of the primary health-care system. The first review included 17 studies of the effects of a range of interventions to change outpatient referral rates or appropriateness.[27] The passive dissemination of guidelines and organisational interventions seemed unlikely to improve referral practices, but several other approaches were promising, including the use of in-house second opinion and the involvement of secondary care providers in guideline dissemination. However, the evidence was mostly of low or very low quality and only one study was undertaken in a low-income or middle-income country. The second review explored the effectiveness of specialist outreach clinics,[34] and reported that such clinics had promising effects on access to care, quality of care, health outcomes, patient satisfaction, and the use of hospital services, although the quality of the evidence was poor. Although none of the assessments were done in low-income or middle-income countries, the review identified several descriptive studies from such settings, indicating that specialist outreach can be implemented where resources are available to provide these services. Taken together, the two reviews suggested several potential strategies for better integrating appropriate care provision across the primary–secondary interface.

One review examined strategies to improve immunisation delivery.[35] Based on 43 studies of the effectiveness of patient or parent reminder and recall systems, such as letter and telephone calls, the review found moderate quality evidence that such strategies can increase immunisations. These interventions were assessed in high-income countries and could only be applied in other countries if they were able to establish immunisation tracking systems. Another review looking at delivery arrangements found that the use of lay health workers seemed to be a promising strategy for promoting immunisation.[25] The use of text messaging reminders might also have promise, since the use of mobile phones is increasing.

Service integration is often seen as a key element of primary health care. One review examined the effects of strategies to integrate primary health-care services in low-income and middle-income countries.[33] The review found limited evidence from four studies of the effects of strategies for integrating primary health-care services at the point of delivery, from comparisons between integrated and vertical approaches to delivering services. The WHO Integrated Management of Childhood Illness programme seems to have promising effects on care delivery, but cointerventions, including the provision of drugs, might have confounded these results.

A review that focused on strategies for working with the private for-profit sector assessed the use of social marketing and drug prepackaging. The included studies showed substantial increases in the use of programme commodities and services, although effect sizes varied. Two of the studies combined social marketing with prepackaged drugs.[28]

A review of studies looking at contracting out primary and secondary health care services in low-income and middle-income countries found evidence that the use of non-governmental organisations to deliver care can increase access to and use of health services, improve patient outcomes, and reduce household health expenditures.[37] These findings are compatible with those from a review by Patouillard and colleagues,[28] which showed mixed effects on the quality of hospital and primary care services for specific conditions, drawing on a different set of studies. However, for both reviews the low quality of the evidence makes the attribution of these effects to the interventions difficult, since they were confounded, for example, by increased expenditure on health care in the group that was contracted out.

Another review explored the effects of interventions to increase the proportion of health professionals practicing in underserved communities.[24] It found no rigorous evidence to support strategies to improve health professional distribution. Some evidence, albeit of very low quality, suggested that professionals from a rural background were more likely to practice in rural areas and that clinical rotations in such settings might affect medical students' decisions to work in underserved

areas. Incentive and support programmes might also increase physician retention rates.

Implementation strategies

Five included reviews exclusively assessed strategies to change professional behaviours or performance to improve the implementation of care. These strategies included guideline dissemination, audit and feedback, educational outreach visits, and educational meetings.[32,38–41] Drawing largely on studies from high-income settings, the reviews suggested that these interventions could result in small to moderate improvements in professional performance and health outcomes, compared with no intervention. A substantial number of these studies were done in primary care settings and the findings could be generalisable to such settings in low-income and middle-income countries.[45–47] Key findings from the five reviews are summarised in panel 3. A sixth review that addressed strategies for working with the private for-profit sector found that several training interventions improved the quality of treatment for various different conditions.[28]

Discussion

Most of the included reviews were of high quality, with only minor deficiencies, although the primary research that was reviewed was often of low-to-moderate quality. This overview has several limitations which result partly from the relative dearth of evidence from low-income and middle-income countries and partly from the need to focus on the most relevant reviews. We assessed only systematic reviews and might therefore have excluded non-systematic reviews with useful information, as well as studies not included in a systematic review. We also excluded disease-specific reviews, although many of the studies in them are included in the reviews summarised here. This is particularly true for reviews of implementation strategies.

Our judgment of each review's relevance to primary health care in low-income and middle-income countries, and hence whether it was included, was based on consensus among the authors, which was sometimes difficult. We did, however, seek comments on these judgments from people working in various low-income and middle-income countries. Both the relevance of the reviews and the applicability of the findings can vary across settings. Similarly, several systematic reviews not included in this overview might be considered relevant to primary health care in at least some settings (webtable 1). Other systematic reviews are discussed elsewhere.[49,50]

Our assessments of applicability and equity considerations are based on the data presented in the reviews, the judgment and experience of the overview team, and comments from colleagues about the summaries on which this overview is based. Few of the included reviews provided any data for the differential effects of the interventions for disadvantaged populations (webtable 3), probably because the studies included in these reviews did not report this. Assessments of applicability were particularly difficult for reviews that included few studies from low-income and middle-income settings.[19,44] Others may have made different assessments based on the same data. Nonetheless, there is a great deal of variation within and across low-income and middle-income countries and judgments must be made about the applicability of the overview findings, or any research, in the specific settings in which decisions are taken. Similarly, context is important in interpreting the evidence. For example, the background and training of lay health workers and the tasks undertaken by them varies substantially across contexts.

Thus, although this overview is valuable for providing a broad summary of relevant information for decision makers, it cannot provide a sufficient basis by itself for making informed decisions about primary health-care systems in a specific setting.

We did not identify systematic reviews that included studies in low-income and middle-income countries for two key aspirations of the Alma-Ata Declaration: intersectoral action and participation in health care. Although several reviews of participation have been undertaken, they either included studies from high-income countries only[51–53] or were not systematic reviews.[54,55] Two included reviews address this issue indirectly.[25,26]

We also identified few reviews relevant to the aspiration of appropriate health care, including referral systems, or focusing on health systems governance arrangements. The last issue relates closely to the Alma-Ata aspiration of participation in health care in its focus on the involvement of different actors—including citizens, health care consumers, and health care providers—in decision making for health care delivery, and is receiving increasing attention internationally.[56–58] The lack of systematic reviews on these topics does not mean that they are not important or that there is no evidence, but it does suggest there is a need to systematically review what evidence there is to inform decisions and future research.

Data for costs and cost-effectiveness was often not available in the included reviews for the health system arrangements and implementation strategies considered here. For example, although strong evidence is available on the effectiveness of lay health worker programmes for certain health issues in low-income and middle-income countries, most of the studies included in that review did not report data for costs or cost-effectiveness,[25] particularly when compared with similar interventions delivered by health professionals. Such data might have to be obtained from other types of studies.[59]

The relatively small proportion of effectiveness studies undertaken in low-income and middle-income countries could suggest that much research funding has been dissipated on poor quality research that does not meet the quality criteria for entry into systematic reviews or that little research in this area has been funded. Funders, including the GAVI Alliance, the Global Fund to Fight

AIDS, Tuberculosis and Malaria, and the World Bank, need to ensure that new programmes are evaluated rigorously so that the knowledge base on the effects of health systems arrangements for primary health care can be strengthened.[60] Funders also need to explore mechanisms for better coordination of their research and implementation activities.[61]

This overview has several important findings: firstly, there is evidence that user fees reduce the use of necessary (as well as non-essential) health services and drugs, thereby further disadvantaging poor populations. However, removal of user fees needs to be accompanied by policies to remunerate health workers adequately, as well as alternative means of financing health care. Other financial mechanisms to improve access to health care need to be assessed, including community-based health insurance and social health insurance schemes. Evidence of the effects of community-based health insurance, particularly on poor populations, remains weak. Although there are a few case reports of promising attempts to scale-up community-based health insurance, such as in Rwanda,[62] subsidies will still be needed to achieve coverage for the poorest people.[63] In general, the removal of financial barriers to essential medicines and services should be considered. Some form of risk sharing is needed, although how best to do this will differ across contexts. A systematic approach is needed for the design, monitoring, and evaluation of alternative models, and should include a description of how revenue is collected (eg, through general taxes, health insurance, donor funding), the type of organisation that collects revenues (eg, public, private not for-profit, private for-profit), who and what is covered, how funds are allocated, from whom services are purchased, and how service providers are paid.[64]

Secondly, there is some evidence of effective strategies for improving quality of care in the private for-profit sector. In view of the importance of this sector in many low-income and middle-income countries, these approaches could be worth pursuing. However, other reviews have shown that care provided in for-profit hospitals or for-profit dialysis clinics generally results in worse outcomes and, in the case of care provided in for-profit hospitals, is generally more expensive.[65–67] Although this evidence is largely from hospitals in the USA, the findings were consistent across several decades, and the same underlying mechanisms could apply in low-income and middle-income countries. Furthermore, evidence of the effects of strategies for working with both the not-for-profit and the for-profit private sector remains limited,[28,37,68] and there are important questions regarding the weight to be given to investing in strengthening the private sector versus strengthening the public sector. Whatever choices are made, governments need to develop capacity to ensure effective, efficient, and equitable health care delivery, since this stewardship role cannot be left to the market alone.

Thirdly, there is promising, although limited, evidence on the effects of strategies to increase integration of primary health-care services.[33,46] Delivering packages of interventions, for example to improve child health, might also contribute to service integration, but evidence here too seems to be limited.[69] Although integration could improve service delivery and outcomes, the effect of strategies to achieve integration need to be assessed. Integration is intended to reduce differences in access and use of health services between geographical and socioeconomic groups, but this can only be expected to the extent that it is targeted at disadvantaged populations and is effective. It could have unintended and unwanted outcomes if it results in overloaded or deskilled health workers or reduces ability and capacity to deliver specific technical services compared with vertical programmes.[33] Vertical programmes, although contrary to the primary health-care vision of Alma-Ata, might therefore have an important role where health systems are weak.[70] However, only a small number of these can be sustained and they can drain resources from the wider health system and lead to service duplication, inefficiency, and fragmentation. So-called diagonal approaches—which attempt to improve disease-specific outcomes through health systems strengthening—have been proposed as a mechanism for addressing health systems weaknesses.[71] A framework to guide the design and implementation of changes between vertical and integrated services might be useful.

Fourth, the review identified encouraging evidence for the effectiveness, for a wide range of services, of task shifting from doctors to nurse practitioners and from health professionals to a wide range of lay providers who have had only short periods of formal training. Another review of the effects of community-based interventions, including traditional birth attendants, on perinatal, neonatal and maternal outcomes also had positive findings, suggesting that these interventions may reduce neonatal and perinatal mortality but showing a non-significant reduction in stillbirths. Community-based interventions also had a substantial effect on maternal morbidity, but not on maternal mortality.[50] These findings regarding task shifting are particularly important given the lack of robust evidence on interventions to improve the distribution and retention of health professionals, and also follow the principle that care should be delivered at the lowest effective level of care. The scaling-up of lay health worker programmes should therefore receive greater attention. Effective and supportive supervision of primary health care is also key to improving service delivery. Although we did not include any reviews on this topic, a recently published review, drawing on limited evidence, suggests that it might be a promising approach.[72]

Fifth, the review indicates that implementation strategies can have important, albeit modest, effects. For some such interventions, such as audit and feedback,

both relative and absolute effects are likely to be larger where baseline compliance to recommended practice is low. Although few studies of quality improvement interventions were undertaken in low-income and middle-income countries, many of the evaluated strategies are feasible in such settings and similar effects could be expected.[18] However, nearly all of the assessments were one-off studies initiated by researchers and there is a paucity of evaluations of quality improvement systems. For example, the effects of outreach visits on prescribing are well documented and this strategy has also been tested in low-income and middle-income countries. However, although some national authorities are now investing in systems for publicly funded outreach visits, evaluations of the cost-effectiveness of such systems have not been reported. Systems for quality improvement as an integral part of primary health care therefore need to be developed and evaluated. The effects of specific interventions also need to be examined. Overall, a range and mix of implementation strategies, selected based on a diagnosis of the underlying problems, will probably be needed to ensure the quality of primary health care.

We have focused here on systematic reviews of the effects of strategies for strengthening primary health-care systems. Other systematic reviews, single studies, and other types of information are necessary to inform decisions about how best to achieve the aspirations of the Alma-Ata Declaration and the Millennium Development Goals. In addition to information on effects, policy makers need information about costs, values, local needs, and the availability of resources. Process evaluations and evidence of mechanisms are needed to understand why strategies succeed or fail and how their effects vary under different conditions.[73] Nonetheless, systematic reviews of effects are an important and neglected input to policy-making processes.[22] The evidence summarised here can help policy makers make better use of scarce resources and avoid unintentionally impairing the efficient and equitable delivery of effective primary health care.

A range of proactive efforts are needed to support policy makers' use of the evidence from reviews.[74] Promoting databases of optimally packaged reviews is an example of a strategy to address one of the factors—timeliness—that emerged from a systematic review of the factors that increased the prospects for research use in policy making.[75] Convening national policy dialogues is an example of a strategy that can address a second factor, namely interactions between research and policy makers. Integrated national initiatives, such as the WHO-sponsored Evidence-Informed Policy Networks, also hold promise.[74,76]

Progress in achieving universal access to primary health care since Alma-Ata has faltered in many countries. Action needs to be taken urgently to improve primary health-care systems in order to achieve the Millennium Development Goals and the aspirations of the Alma-Ata Declaration. There are numerous promising health systems strategies to improve the delivery and performance of primary health care in low-income and middle income settings. These need to be tailored to local circumstances and health systems, and accompanied by rigorous evaluation until the evidence base is stronger. The alternative is to remain as uncertain 30 years from now as we are currently about the effects of governance, financial, delivery, and implementation strategies on primary health care.

Contributors

AH, AO, JL and SL conceived and wrote the paper. AH, AO, JL, NS and SL screened studies for inclusion in the review. AL, GB, MC, AC, SF, SGM, TP, GR, ST, CSW and SL assessed and summarised the included reviews. All authors commented on drafts of the paper. SL will act as the guarantor.

Conflict of interest statement

AH, AO, and SL were co-authors of some of the included systematic reviews. AO and SL are editors of Cochrane review groups which published some of the included reviews. We declare that we have no other known conflict of interest.

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Alma-Ata: Rebirth and Revision 3

Improving the prevention and management of chronic disease in low-income and middle-income countries: a priority for primary health care

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See **Editorial** page 863
This is the third in a **Series** of eight papers about Alma-Ata: rebirth and revision

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The burden of chronic diseases, such as heart disease, cancer, diabetes, and mental disorders is high in low-income and middle-income countries and is predicted to increase with the ageing of populations, urbanisation, and globalisation of risk factors. Furthermore, HIV/AIDS is increasingly becoming a chronic disorder. An integrated approach to the management of chronic diseases, irrespective of cause, is needed in primary health care. Management of chronic diseases is fundamentally different from acute care, relying on several features: opportunistic case finding for assessment of risk factors, detection of early disease, and identification of high risk status; a combination of pharmacological and psychosocial interventions, often in a stepped-care fashion; and long-term follow-up with regular monitoring and promotion of adherence to treatment. To meet the challenge of chronic diseases, primary health care will have to be strengthened substantially. In the many countries with shortages of primary-care doctors, non-physician clinicians will have a leading role in preventing and managing chronic diseases, and these personnel need appropriate training and continuous quality assurance mechanisms. More evidence is needed about the cost-effectiveness of prevention and treatment strategies in primary health care. Research on scaling-up should be embedded in large-scale delivery programmes for chronic diseases with a strong emphasis on assessment.

Introduction

The health transition to chronic, non-communicable diseases becoming the leading causes of death and disability worldwide is well underway. However, many low-income and middle-income countries are still facing large burdens of infectious diseases and serious maternal, newborn, and child health challenges. In these countries, an estimated 28 million people die annually from chronic, non-communicable disorders, such as cardiovascular disease (mainly heart disease and stroke), cancer, chronic respiratory disease, and diabetes.[1] Another 2·1 million are estimated to have died from HIV/AIDS in 2007.[2] The challenge to the health system in low-income and middle-income countries in terms of people living with chronic diseases is huge: around 33 million with HIV/AIDS; 246 million with diabetes;[3] and around 1 billion with hypertension.[4] Hundreds of millions suffer from mental disorders including depression, alcohol misuse disorders, and schizophrenia.[5]

Though these disorders all have different causes, the demands (including financial costs) they place on patients, families, health-care systems, and governments are remarkably similar and substantial. From a health-care perspective, all are chronic diseases: they persist over time and require continuing care. Primary health care (see accompanying paper for discussion of the definition and taxonomy of different approaches[6]) is, in theory, best positioned to address the challenges of chronic disease prevention and management. The delivery of care in primary health-care settings is compromised in most low-income and middle-income countries by underfunding and an orientation towards acute problems. Health systems must evolve rapidly to manage common chronic diseases, irrespective of cause.

Generic disease-management strategies, including system-level changes in primary health care, hold promise for improving quality of care across a range of chronic diseases. In this article, we make the case that primary

Key messages

- The burden of chronic diseases, which require care for extended periods or even throughout life, is increasing in low-income and middle-income countries
- An integrated approach to the prevention and management of common chronic diseases, irrespective of cause, is needed in primary health care
- Chronic disease management is distinct from health care for acute problems, and a refocusing and strengthening of primary health care is urgently required
- Chronic diseases need opportunistic case finding for assessment of risk factors, detection of early disease, and identification of high risk status; a combination of pharmacological and psychosocial interventions, often in a stepped-care fashion; long-term follow-up with regular monitoring and promotion of adherence to treatment
- Improved strategies in primary health care should be accompanied by public policies to prevent chronic diseases, particularly through tobacco control and reduced salt intake
- Research on scaling-up should be embedded in large-scale programmes; this will require collaboration between policy makers, practitioners, consumers, public-health researchers, development agencies, and funding organisations

health-care strategies need to be developed, assessed, and implemented in low-income and middle-income settings to address the increasing burden of chronic disease and outline the requirements for such strategies.

Chronic diseases as a public-health priority

To help the worldwide community and national authorities to focus on prevention and control of chronic diseases, WHO proposed a goal, in addition to the Millennium Development Goals, that aims to reduce chronic-disease death rates by 2% per year over current trends.[7] The goal is ambitious but achievable on the basis of current knowledge as summarised in the recent series on chronic diseases in *The Lancet* (panel 1);[8,9] nonetheless strengthened and reoriented primary health-care systems are needed.

With the advent of affordable highly active antiretroviral therapy (HAART) in low-income and middle-income countries and improved survival prospects, HIV/AIDS is increasingly viewed as a chronic disease. Prevalence seems to be stable worldwide with the numbers of people living with HIV increasing as the population grows and survival time increases.[2] More than two-thirds of people living with HIV/AIDS are in sub-Saharan Africa where eight countries have an adult prevalence of 15% or more. In many countries, dual epidemics of tuberculosis and HIV/AIDS require an integrated response. The challenge now is to expand access to HAART and to treatment for tuberculosis further in settings where health systems are struggling to respond (panel 2).[13–16] Much of the provision so far has been focused on hospitals and clinics; there is, however, a need to extend provision to rural settings and urban slums in which such facilities are lacking.

A compelling case has been made for investment in expanded programmes for the control, elimination, and eradication of neglected tropical diseases with highly cost-effective community-delivered interventions for schistosomiasis, lymphatic filariasis, intestinal helminths, onchocerciasis, and trachoma.[17] Although such programmes are imperative for the poorest 1 billion people who lack access to treatments for neglected diseases, we focus on chronic conditions that cannot be dealt with in this way. Apart from tobacco control, we have not attempted to address the prevention and management of cancer in this article.

Panel 1: Chronic diseases and global mental health

The 2007 series on chronic diseases in *The Lancet* began with an update of the burden of chronic diseases and the implications of the Global Goal for Chronic Disease Prevention and Control for the 23 countries with 80% of the total chronic-disease burden in low-income and middle-income countries. The evidence on scaling up cost-effective interventions for the prevention and control of chronic diseases was reviewed and strong support found for population-wide reductions in salt intake, key elements of the WHO Framework Convention on Tobacco Control, and opportunistic screening of patients at high risk of cardiovascular disease and the treatment with a multidrug regimen for people with a 15% or greater risk of an event in the next 10 years.[8,9] Together, population-wide and high-risk interventions will, in the 23 countries, avert 32 million deaths by 2015, half under the age of 70 years; cost US$5·8 billion per year with major economic benefits, even if a life saved is valued at as little as $2000; and exceed the global goal in these countries. The series ended with a call to action for all major stakeholders and a commitment to review global progress in 2 years time.[10]

Mental disorders affect people across the life-course, from autism in childhood, alcohol misuse and depression in adults, to dementia in older people. *The Lancet*'s series on global mental health in 2007[11] showed that, apart from the large burden and associated disability and mortality attributable to mental disorders, they are so intimately linked with other health concerns, including other chronic diseases, that there can be no health without mental health. Global mental-health resources are characterised by three features: scarcity; inequity in their distribution; and inefficiency in their allocation, with the lion's share being spent on psychiatric hospitals and institutional care rather than primary and community care. There is evidence that low-cost drug and psychosocial treatments are feasible, affordable, and effective for many mental disorders. These treatments can be delivered by community or lay health workers with adequate training and supervision. Despite this evidence, in many countries the treatment gap exceeds 50% even for the most severe disorders. Scaling up a package of cost-effective treatments for a core group of three mental disorders (schizophrenia, depression, bipolar affective disorder) and one risk factor (hazardous alcohol use) would cost about $2 per person per year in low-income countries and $3–4 in lower middle-income countries.[12]

Interventions for chronic diseases in primary health care

Interventions selected for use in primary health care must lead to favourable changes in risk status and outcomes, be cost effective, and be financially and logistically feasible. Cost-effective interventions for chronic diseases are available for implementation across a range of resource settings.[18] Several of these interventions are financially feasible for scaling-up and have the potential to substantially reduce the burden of chronic disease in low-income and middle-income countries. The most compelling evidence is for tobacco cessation,[19] as one component of a comprehensive approach to tobacco control; a multidrug regimen for people with pre-existing cardiovascular disease or at high risk of developing cardiovascular disease;[8,9] the management of non-insulin-dependent diabetes;[20] and several interventions for depressive disorders and alcohol misuse disorders.[21] Scaling-up of the provision of HAART for eligible people living with HIV requires simplification of management with a standardised approach.[14]

Cost-effective interventions can be delivered as a package in primary health care (table).[21–33] Although strong evidence on the care of type 2 diabetes in primary health care in low-income and middle-income countries is limited, no reason exists, in principle, why management could not be dealt with as in high-income countries with behavioural interventions, treatment of cardiovascular-disease risk factors, and generic antidiabetic agents, particularly metformin.[34] All interventions could be delivered by stepped care with supervision by a physician where available or, if unavailable, a specially trained non-physician clinician.

***Panel 2:* Scaling-up of HIV treatment**

WHO has suggested several innovations to scale up provision of chronic HIV treatment:

- Standardisation of first-line and second-line treatment with fixed-dose first-line combinations, driving down the price of these drugs
- Simplification of clinical decision making without routine immunological monitoring
- Decentralisation of treatment to the district level through the development and training in adapted integrated management of adult illness guidelines
- Task shifting of essential activities, such as initiation and monitoring of treatment, from physicians to nurses and other health workers
- Strengthening of procurement and supply management with a focus on reducing the number of commodities and drugs and being more specific of exact requirements[13]

In Malawi, where 1 million people—of a total population of 12 million—are infected with HIV, a public-health approach to HIV/AIDS management is being successfully scaled up; care is delivered mainly by nurses and other non-physician health workers, who use a simplified treatment regimen based on the tuberculosis DOTS (directly observed treatment, short course) system;[14] such an approach has allowed scaling-up of the provision of HIV treatment, and early results suggest that although early mortality is high, the medium-term outcomes for those on such programmes is good.[15,16]

Tobacco control in primary health care

Despite its potential for a rapid decrease in tobacco-induced death and disability, cessation advice and services have not received sufficient attention, especially in the context of routine health care. The goal of tobacco control policy in primary health care is to ensure that all adult patients are briefly questioned about tobacco habits, all tobacco users are advised to quit, and appropriate follow-up cessation services are offered to people who express interest. Much of the evidence, however, relates to advice by physicians in high-income countries.[30] In low-income and middle-income countries, wider access to nicotine replacement therapy, one part of a complete cessation service, might be achieved for between US$55 and US$761 per disability-adjusted life year saved.[19] This estimate is similar to those for other non-price tobacco-control interventions, but considerably less cost-effective than price increases for tobacco products.

Health promotion in primary health care

Despite their popularity, evidence is limited to support community-wide interventions based on primary health care for the primary prevention of cardiovascular disease through multiple risk factor intervention.[35] A systematic review of the trial evidence on advice and counselling to reduce dietary fat, increase exercise, and stop smoking, involving over 130 000 people in primary health care and occupational health settings, did not detect any substantive effect on mortality from coronary heart disease.[36] However at least in high-income settings, similar interventions to reduce risk behaviours in people with serious risk factors or pre-existing disease—hypertension, cardiovascular disease, impaired glucose tolerance and diabetes—are more successful in achieving reductions in risk factors and, in some circumstances, improving clinical outcomes.[36]

Pharmacological interventions for people at high risk of cardiovascular disease and diabetes

There is a dearth of large trials of drug interventions for primary and secondary prevention of cardiovascular disease in low-income and middle-income countries, but such treatments will probably have similar outcomes to those reported in trials from high-income countries. The wide use of a single combination pill for people at high risk of cardiovascular disease has long been advocated[37] and clinical trials are underway to investigate its acceptability, feasibility, and safety. Evidence is, however, available on the likely cost-effectiveness of a multidrug regimen in low-income and middle-income countries.[31] Reductions in cost of drugs have put them within reach of increasing numbers of people, especially in middle-income settings. The annual costs for hydrochlorothiazide (25 mg), atenolol (50 mg), and enalapril (10 mg) are around US$1, $3, and $8, respectively,[38] and statins are becoming progressively more affordable. Drug costs vary greatly from one country to another and between the private and public sectors within countries. Individuals suitable for preventive use of drugs could be identified through opportunistic screening in primary health care by use of easily measured risk factors, such as a brief history of alcohol and tobacco consumption, body-mass index or

	Interventions	Level of evidence
Depressive disorders	Generic antidepressants; brief psychotherapies	Randomised controlled trials in several countries[17,21-26]
Hazardous alcohol use	Brief counselling	Cochrane systematic review,[27] WHO multicentre randomised controlled trial[28]
Tobacco use	Brief counselling and cessation advice and follow-up, nicotine-replacement therapy	Cochrane systematic reviews[29,30]
High risk of cardiovascular disease	Multidrug regimen and health promotion advice	Randomised controlled trials of components of multidrug regimen and systematic reviews[9-11]
Impaired glucose tolerance	Risk-factor modification through behavioural intervention or metformin	Randomised controlled trials[32,33]

Table: **Cost-effective interventions for chronic, non-communicable diseases in low-income and middle-income countries that could be delivered in primary health care**

waist circumference, blood pressure, and a clinical history of cardiovascular disease; secondary prevention could be directed to individuals with known cardiovascular disease.

This approach to scaling-up a multidrug regimen for individuals with existing cardiovascular disease or who are at high risk of cardiovascular disease could avert almost 18 million deaths over the next 10 years in 23 low-income and middle-income countries. The annual financial cost would be an average of US$1·10 per person.[9] Laboratory measurements, such as cholesterol concentrations, offer no additional predictive value above measurement of blood pressure and body-mass index and history taking in routine primary care.[39] Thus, scale-up of such programmes in low-income and middle-income countries should be possible, even where widespread laboratory measurements are not feasible.

Prevention of diabetes

There is evidence from a trial in India that progression to diabetes from impaired glucose tolerance can be prevented by behavioural interventions and drug treatment with metformin;[33] the cost-effectiveness of behavioural interventions was comparable with that of metformin, and the number needed to treat with either intervention to prevent one case of diabetes would be seven. Several other clinical trials in high-income countries and one in China have shown that lifestyle interventions can reduce the incidence of diabetes in people with impaired glucose tolerance.[32] However, to be implemented, blood-glucose testing would need to be available to detect glucose intolerance. In many high-income countries, non-insulin-dependent diabetes is routinely managed in primary care, often largely by nurses. A similar approach has been used for diabetes, hypertension, and asthma in rural South Africa and resulted in successful control of the disorders in a high proportion of patients.[20] Mexico provides an example of the application of chronic disease management approaches to diabetes in a primary health-care setting (panel 3);[40] more evidence of cost-effectiveness and sustainability of such approaches in low-income and middle-income countries is needed.

Treatment of mental disorders in primary care

The Lancet Series on Global Mental Health (panel 1) has called for action to scale up services for mental disorders in low-income and middle-income countries with an emphasis on primary care and community-based delivery systems. There is robust international evidence on the efficacy of pharmacological and psychological treatments (notably cognitive-behavioural therapy and interpersonal therapy) for common mental disorders, such as depression, anxiety, and somatoform disorders;[21–23,41] there is also a growing global evidence base testifying to the cost-effectiveness of these interventions.[12,24–26] The strongest evidence for the management of alcohol misuse in primary health-care settings is for brief psychological interventions and motivational interviewing delivered by physicians or nurses.[28]

Panel 3: Mexico's Veracruz initiative for diabetes awareness[40]

Mexico's Veracruz initiative for diabetes awareness (VIDA) shows the potential of implementing chronic-disease management principles in low-resource primary health-care settings.

VIDA was designed to improve primary health care for people with diabetes. The 1-year study included ten health centres, half of which were randomly selected as intervention sites. Health workers received in-service training on diabetes management, including foot care, and also learned about principles of effective health care for chronic disease as represented by the chronic care model. Importantly, health workers were taught how to apply a continuous quality improvement method (plan-do-study-act) to identify service gaps and areas for improvement, to generate and to implement potential solutions, and to assess organisational changes. A range of team-generated solutions were applied, including the implementation of a structured diabetes education programme for patients and their families.

Results suggest that both clinical process indicators (eg, documented foot care education) and health outcome indicators (eg, HbA_{1c}) improved significantly more in the intervention group than in the control group. Notably, the project's success was not the result of a single intervention, but rather of a systems-based approach that included patients' education and self-management support. No single factor seemed to have a greater effect on outcomes than any other, although the patients who learned the most (those with scores greater than 80% on the postintervention diabetes knowledge examination) achieved better metabolic control and greater reduction of total cholesterol. A key lesson from this experience is that the responsibility for health-care delivery does not lie exclusively with the physician and the nurse; a well-operating team is fundamental, and most importantly, the participation of people with diabetes contributes substantially to successful outcomes.

Despite evidence on the efficacy of specific treatments for mental disorders, the treatment gap is large.[42] Training of primary health-care workers shows short-term benefits;[43,44] however, without sustained support these benefits diminish over time.[45,46] Several resource materials and manuals are available for integration of mental health in primary care materials,[47,48] but practice guidelines for mental-health disorders in the UK also show little integration.[49] Experience in low-income and middle-income countries indicates that to be fully effective and efficient, primary care tasks must be limited and feasible.[50] Primary mental health care (as with primary health care for other chronic diseases) must be complemented by additional levels of service, including components of secondary care to which primary health workers can turn for referrals, support, and supervision.

Detection of mental disorders should be done through opportunistic screening of adults attending primary health-care facilities by use of validated brief screening questionnaires for common mental disorders and excessive alcohol consumption.[51–53] In literate populations, such screening can be done while patients are waiting to see a primary care worker. Although recognition is important, it must be accompanied by an evidence-based treatment plan to lead to long-term recovery.[54] The effectiveness of

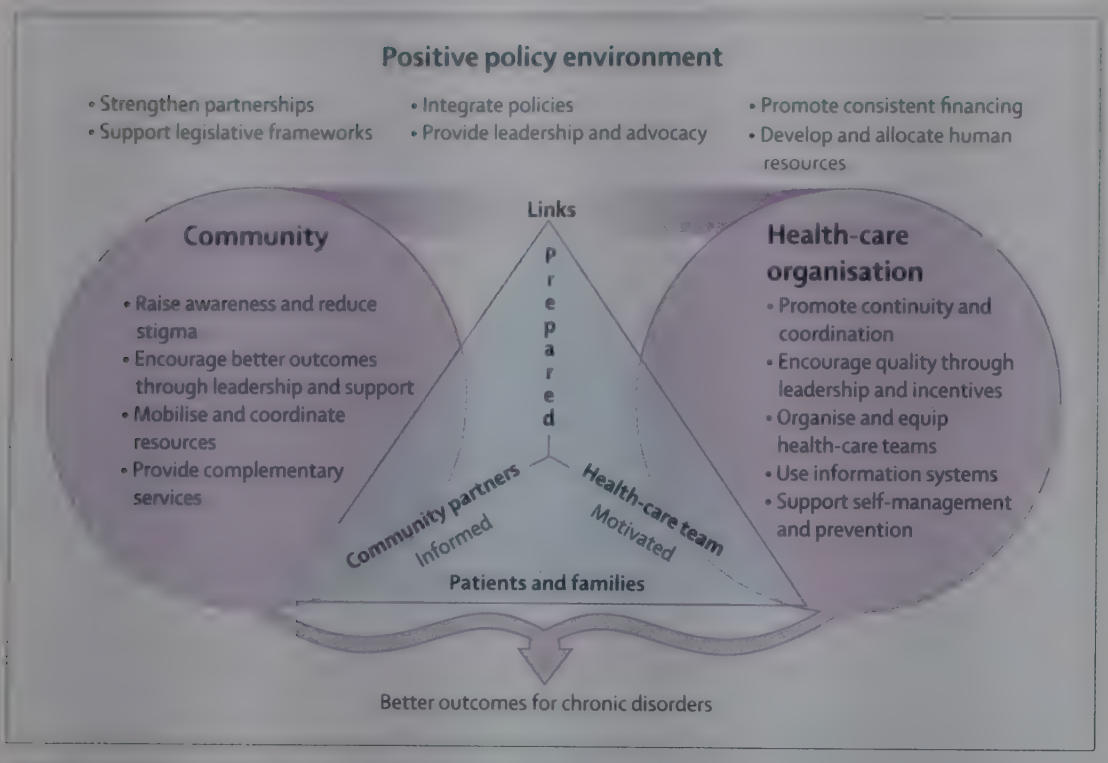
Positive policy environment
• Strengthen partnerships
• Support legislative frameworks
• Integrate policies
• Provide leadership and advocacy
• Promote consistent financing
• Develop and allocate human resources
Community
• Raise awareness and reduce stigma
• Encourage better outcomes through leadership and support
• Mobilise and coordinate resources
• Provide complementary services
Links
Prepared
Community partners Informed
Health-care team Motivated
Patients and families
Health-care organisation
• Promote continuity and coordination
• Encourage quality through leadership and incentives
• Organise and equip health-care teams
• Use information systems
• Support self-management and prevention
Better outcomes for chronic disorders

Figure: **Innovative care for chronic conditions framework**

psychosocial interventions and adherence management delivered by appropriately trained and supervised lay health workers is being assessed in India.[55,56]

Integration of care for HIV/AIDS and other chronic diseases

The integration of HIV/AIDS and tuberculosis care is essential especially where co-infection is a serious problem; both are chronic disorders. A compelling case has also been made for the integration of mental health care into care for people living with HIV/AIDS.[57] Several issues related to mental health are relevant to the management of HIV/AIDS, such as cognitive impairment and dementia caused by viral infection of the brain and depression and anxiety due to the effect of the infection on a person's life. Despite the coexisting high burden of HIV, diabetes, and cardiovascular disease in several low-income and middle-income countries,[58] little work has been published on the integration of care for these disorders. A recent paper on the experience of combined clinics for diabetes, HIV/AIDS, and hypertension in provincial hospitals in Cambodia, showed good acceptability and over 70% retention of patients after 24 months.[59] With appropriate resources and support, there seems no reason why such approaches could not be used in primary health care. The increased risk of myocardial infarction with antiretroviral therapy (most clearly established for protease inhibitors) is an additional reason for developing integrated programmes.[60] Adaptation of the DOTS (directly observed treatment, short course) tuberculosis programme in Africa for chronic-disease management has also been advocated.[61]

Organisation and delivery of chronic-disease management in primary health care

The challenge now is to ensure that primary health-care systems in low-income and middle-income countries are capable of delivering these interventions. Primary health care for chronic diseases is inherently different from care for acute problems and requires a greater level of organisation that must be sustained, commonly over a patient's lifetime. In addition, because patients are in many ways their own primary carers, their needs and preferences must be taken into account in the development of management plans. Primary health care has several advantages: the relative proximity of providers to the patients' homes reduces travel costs; knowledge of individual patients, families, and local communities by primary care workers; the possibility of caring for defined populations makes coverage and follow-up easier to assess and monitor; and better continuity of care, including that for comorbid illnesses. These advantages might, of course, not be realised or might be offset by deficiencies in training, supervision, drug supply, and morale, but they offer the hope of improved chronic disease management for millions.

Several organisational models of management for chronic diseases have been proposed and implemented internationally. According to a comprehensive report published in 2006,[62] the best known and most influential is the chronic care model,[63] which focuses on linking informed, actively engaged patients with proactive and prepared health-care teams. In 2002, WHO produced an expanded version of the chronic care model, the innovative care for chronic conditions framework (figure), which gives greater emphasis to community and policy features of improving health care for chronic diseases.[64]

The innovative care for chronic conditions framework in turn influenced the development of WHO's integrated management of adolescent and adult illness programme[65] (panel 4). Several related approaches are being used to guide the provision of chronic care in specific countries.[67–69] Although details vary, they emphasise the central importance of primary health care in chronic disease prevention and management. Other models of chronic disease management that have had international influence include a stepped-care approach, best-known as the "Kaiser Pyramid";[70] the chronic disease self-management programme[71] (known in the UK as the expert patient programme); and WHO's service organisation pyramid for an optimal mix of services for mental health.[72]

According to the chronic care model, six areas need improvement to facilitate chronic care: community resources; health systems; self-management support; decision support; delivery-system redesign; and clinical information systems. Each is described below for its relevance to strengthening primary health care in low-income and middle-income countries.

Community resources

People with chronic diseases spend the most of their time outside of a primary health-care setting. Primary health-care services that establish formal linkages with their communities leverage untapped resources and help

to ensure healthy and facilitative environments for people, especially elderly people living with chronic diseases[73] or mothers with depression.[74] Action by various sectors at the community level was a key component of primary health care in the Alma-Ata Declaration and has the potential to influence risk factors for chronic disease, for example by encouraging and supporting changes in health behaviour. However, further evidence is needed on both how to implement intersectoral actions at all levels of society and the cost-effectiveness of this approach.

Health systems

For patients to be attracted and retained and continuity of care provided, several features of health systems must be strengthened. Private and informal health-care sectors are presently the main providers of chronic care in most low-income and middle-income countries. Stewardship from government policy makers will be essential to the improvement of quality of care and integration of fragmented provision of chronic care across the many different providers. The funding and implementation of robust supply systems for drugs and equipment are priorities for health systems. Implementation of information systems at both the clinical and management levels will form the backbone of high-quality health programmes. Finally, the development of fair and affordable financing options that lower barriers to treatment will be essential in improving outcomes for patients.

Self-management support

Primary health-care workers have a central role in supporting patients to self-manage their illnesses successfully, and importantly, this support goes well beyond disease education. Patients and their carers need to be informed about self-management strategies and motivated and skilled to implement them. Self-management support programmes led by lay people have been researched, largely in high-income countries, and evidence suggests they have a modest effect on some outcomes, such as pain, disability, and depression, as well as self-efficacy (ie, patients' confidence about managing their own illness).[75] Self-management support groups led by health workers have been associated with improvements in important disease outcomes, such as blood pressure, body-mass index, and HbA_{1c},[76,77] as well as adherence to HAART.[78]

Decision support

To be effective, guidelines must be integrated into the fabric of decision making, for example through visual reminders and performance feedback. In addition to guidelines, primary health-care workers must have continuous access to professionals with expertise and experience in the care of specific illnesses. These may be physicians or non-physician specialists. The effectiveness of guideline implementation and other decision support strategies are reviewed in an accompanying article.[6]

Delivery-system design

Primary health-care design (or redesign) typically includes the introduction of planned follow-up visits for all patients with chronic disease and the reorganisation of health workers' roles and responsibilities, usually towards a multidisciplinary team approach. Multidisciplinary teams can take several forms. Frequently, non-physician team members and sometimes "expert patients" are designated to have clear, circumscribed roles in primary health care. Case managers and outreach workers are sometimes recruited to provide close follow-up of patients with complex care needs. Continuous support from specialists to primary health-care workers is effective for the management of mental disorders in high-income settings.[79] However, a recent Cochrane review of shared-care interventions for a range of chronic diseases, including depression, revealed mixed results.[80,81] Shared care significantly improved appropriate prescribing and drug adherence and use; however, health status was not improved. Results for low-income and middle-income countries have yet to be well assessed.

***Panel 4:* Integrated management of adolescent and adult illness**

WHO's Integrated Management of Adolescent and Adult Illness (IMAI) programme has been in development since 2001, when it was conceptualised as a set of guidelines and tools for the comprehensive management of adult illness (both acute and chronic features) in low-resource primary health care settings. In 2003, IMAI was re-focused exclusively towards the management of HIV/AIDS, although it remains applicable to other adult illnesses.

IMAI provides practical tools for country adaptation, including health-service management at national and district level; training and guidelines for clinical teams; post-training support; patients' education and self-management materials; and a standardised monitoring system for patients. Treatment teams are typically headed by doctors or medical officers but composed mainly of non-physician clinicians, people living with HIV, and other lay providers. Task shifting is a key feature of IMAI and promotes sharing of clinical management responsibilities to the lowest relevant cadre and into the community, which is vital for effective chronic disease management. The most important task shift is to the patient, who is informed and equipped by the health-care team for effective self-management and adherence.[13] Health workers are taught to use the "5As"[66] (assess, advise, agree, assist, arrange) in all clinical interactions, which helps develop and refine self-management, and reinforces treatment partnerships with patients.

One of IMAI's most distinctive elements is its focus on the management of chronic disease and prevention, rather than just the treatment of acute illness. This supports the shift from an exclusively acute care model of health service delivery to a chronic care model. Assessment has not yet been completed but observations indicate that the chronic-care approach has been well received by health workers. The programme is now being implemented in more than 40 low-income and middle-income countries. An IMAI diabetes module is in preparation and will be field-tested in three such countries that are already using IMAI HIV/AIDS modules.

***Panel 5:* Research requirements to improve chronic disease prevention in primary health care and management strategies for low-income and middle-income countries**

- Development of improved models to estimate future treatment needs in primary health care
- Assessment of cost-effectiveness of methods of monitoring and controlling risk factors for chronic diseases
- Assessment of threats or opportunities of new trade agreements for production or procurement of essential drugs
- Identification of barriers to access to chronic disease treatment when provided free
- Studies of the cost-effectiveness of substituting physician tasks with skilled nurses and other non-physician clinicians for chronic diseases
- Assessment of integrated adult management protocols for clinical management
- Assessment of cost-effectiveness of chronic-care clinical protocols
- Assessment of adherence support interventions for chronic diseases at the individual, family, and community levels
- Development and assessment of appropriate clinical information systems for chronic care in low-income and middle-income countries

Clinical information systems

Primary health-care workers can use monitoring systems to identify patients' needs, plan care over time, monitor responses to treatment, and assess health outcomes. Monitoring of patients typically involves use of individual patients' cards or records, which are subsequently aggregated to provide information about the clinical population. Simple paper-based systems, if designed properly and shown to be cost-effective, can be used to monitor individual patients' treatment, outcomes, and preventive activities, to remind health workers about care plans, and to provide information about the prevalence of disorders in the clinical population. In the future, paper-based systems are likely to be superseded by low-cost IT systems, including the use of mobile technology.

Improving the quality of chronic-disease management

Controlled studies and reviews from high-income countries have shown that, across a wide range of chronic diseases, the implementation of primary-care-led management models can produce improved health outcomes.[34,82–87] Complex interventions that incorporated clinician education, an increased role of the nurse (nurse case management), and a greater degree of integration between primary and secondary care (consultation-liaison) were more likely to be beneficial in depression.[86] However, effect sizes show heterogeneity between assessments in asthma, congestive heart failure, diabetes, and depression that makes pooled effect sizes of debatable value.[87] No single intervention component has emerged as the underlying driver of success. Rather, multidimensional intervention packages that incorporate several distinct features of chronic-disease management seem to be most effective, including both pharmacological and psychosocial interventions, collaboration between different members of the primary care team, involvement of patients and families together with a stepped-care approach and clear referral pathways, and appropriate supervision depending on response to intervention and severity of disease. Analogous evidence from low-income and middle-income countries is sparse but promising.[20,23,40,88]

Improvement of adherence to treatments

A systematic review of interventions to improve adherence in chronic disease showed that adherence increased most consistently with behavioural interventions that reduced dosing demands (all of three studies) and those involving monitoring and feedback (three of four studies).[89] Adherence also improved in six multisession informational trials and eight combined interventions. 11 studies (four informational, three behavioural, and four combined) showed improvement in at least one clinical outcome, but effects were variable and not consistently related to changes in adherence; only two studies were in low-income or middle-income countries. Such strategies need to be adapted to and assessed in primary health care in resource-constrained settings. For adherence strategies to be effective, a constant supply of treatments must be ensured.

Addressing the challenges of scaling-up

Scaling-up of efficacious interventions in primary care faces several challenges,[90] notably that health workers are already overburdened with many responsibilities, lack supervision and specialist support after training, and often do not have a guaranteed continuous supply of drugs. The shortage of health workers around the world has attracted much attention in recent years.[91–94] In response, global strategies have been developed to scale up the workforce in low-income and middle-income countries and to provide adequate incentives and better working conditions to ensure the retention of health workers.[95] Amidst the urgency to train and retain a health workforce, the related importance of ensuring that health workers have the right competencies to manage their clinical populations must not be ignored. Given the rapid increase of chronic diseases in low-income and middle-income countries, consideration is being given as to how best to prepare health workers for effective management of these disorders. In 2005, WHO published a review that elucidated five core competencies for delivery of effective health care for patients with chronic diseases.[96,97] The five basic competencies that apply to all members of the workforce caring for patients with chronic diseases are patient-centred care, partnering, quality improvement, information and communication

technology, and a public health perspective. The competencies now must be translated into reality by initiation of reform efforts in health training institutions and centres of continuing education around the world.

Scaling-up the workforce for chronic diseases also involves task shifting and the use of multidisciplinary teams. Non-physician clinicians (including health officers and nurses) are common in many low-income and middle-income countries.[98] There are many advantages to the use of such clinicians in primary care settings; in some roles with adequate support, they seem to function as effectively as—or better than—physicians.[6,99–102] With appropriate training and equipment, these health workers can screen adult patients, provide appropriate interventions, and promote adherence to treatment with evidence-based strategies.[103,104] Task shifting can extend to non-professionals, including community members and expert patients.[105,106] Specialist nurses (eg, psychiatric nurses) and physicians have important parts to play in supervising non-physician clinicians and in providing direct care in complex cases.

In many countries, strengthening the capacity of the state to manage different providers of care is crucial to scaling-up because many patients currently use several providers, both public and private, resulting in lack of continuity of care. Improved governance and regulation are needed to address variable quality.

Conclusions

Many research questions still need to be addressed, but this is no excuse for inaction. Research on scaling-up should be embedded in large-scale programmes needing collaboration between national policy makers, practitioners, public-health researchers, development agencies, and funding organisations. Many of these questions are within the scope of public health and health policy and systems research (panel 5). There are important unresolved questions about cost-effective treatments for specific disorders, the role of management packages of integrated interventions, and more general issues concerning implementation of available knowledge.

Integrated primary health-care approaches are of central importance in tackling the growing burden of chronic diseases, irrespective of cause. Management of chronic diseases in primary health care is fundamentally different from that for acute care. Primary health care is probably more effective when complemented by effective public policies to tackle major risk factors, such as tobacco use, obesity, and excessive salt consumption. Much of the evidence about chronic disease management comes from high-income countries, and the approaches need adapting to settings in which there is often a lack of medically qualified staff, many patients commonly with comorbidities, and lack of laboratory support for basic biochemistry. Opportunistic screening may be difficult to operationalise when consultations last only a few minutes, which, in turn, will necessitate addressing deficiencies in the health workforce. To avoid unnecessary delay while ensuring that lessons are learnt, research-funding organisations, donors of aid, and national governments must work together to ensure that assessment is integrated within major health-care delivery programmes as they are scaled up.

Contributors

AH conceived the paper and sections were drafted by RB, J E-J, VP, and AH. All authors contributed to the revisions.

Conflict of interest statement

We declare that we have no conflict of interest.

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Alma-Ata: Rebirth and Revision 4

30 years after Alma-Ata: has primary health care worked in countries?

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See Editorial page 863
This is the fourth in a Series of eight papers about Alma-Ata: rebirth and revision

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We assessed progress for primary health care in countries since Alma-Ata. First we analysed life expectancy relative to national income and HIV prevalence to identify overachieving and underachieving countries. Then we focused on the 30 low-income and middle-income countries with the highest average yearly reduction of mortality among children less than 5 years of age, describing coverage and equity of primary health care as well as non-health sector actions. These 30 countries have scaled up selective primary health care (eg, immunisation, family planning), and 14 have progressed to comprehensive primary health care, marked by high coverage of skilled attendance at birth. Good governance and progress in non-health sectors are seen in almost all of the 14 countries identified with a comprehensive primary health care system. However, these 30 countries include those that are making progress despite very low income per person, political instability, and high HIV/AIDS prevalence. Thailand has the highest average yearly reduction in mortality among children less than 5 years of age (8·5%) and has achieved universal coverage of immunisation and skilled birth attendance, with low inequity. Lessons learned from all these countries include the need for a nationally agreed package of prioritised and phased primary health care that all stakeholders are committed to implementing, attention to district management systems, and consistent investment in primary health-care extension workers linked to the health system. More detailed analysis and evaluation within and across countries would be invaluable in guiding investments for primary health care, and expediting progress towards the Millennium Development Goals and "health for all".

Alma-Ata—worldwide rhetoric and country reality

Although an understanding of worldwide trends and policy shifts is important, improvements in health depend on what happens at national, subnational, and district levels and, ultimately, in the communities in which families live and die. In the past three decades, great progress has been made.[1] For a girl born in Alma-Ata in 1978, the risk of dying before her fifth birthday was 7·3%. This risk for a baby born in 2008 in what is now Almaty, Kazakhstan is less than half at 2·9%. This reduction is similar to the worldwide average reduction during the past 30 years, with mortality for children less than 5 years of age decreasing from 145 per 1000 before the Alma-Ata Declaration to 72 per 1000 live births now (a 50% reduction). However, the reduction has been less in the least developed countries (42%) than in the richest countries (77%). Similar patterns exist for maternal mortality and life expectancy.

National data are important to track regional and worldwide trends but, most importantly, should be used for appropriate action within countries and to ensure governments are accountable for provision of services to the poorest citizens. James Grant, Director of UNICEF at the time of the first-child survival revolution, placed great emphasis on objective measures of progress, using national data as an important impetus for action, notably through yearly reports ranking countries' progress such as Progress of Nations and State of the World's Children.[1] Countdown to 2015[2] represents a further iteration in the measurement of country progress, returning to some of the core Alma-Ata principles, including tracking equity and progress in other sectors (such as education, water, and sanitation). Although few of the 68 Countdown priority countries are on track for Millennium Development Goals (MDGs) 4 and 5,[3] a substantial number of low-income countries, some not included in the Countdown list, have made major progress in the past 30 years in delivery of primary health-care services at high coverage, and reduced maternal and child deaths. Some of these countries provide examples of sustained success in the presence of poverty, political instability, or high HIV/AIDS prevalence. An improved understanding of the factors associated with such progress could help to expedite progress in other countries. For some large countries, such as India, where each state can be larger than some countries and between-state variation is enormous, well-achieving states, such as Kerala, contrast with those where child mortality is at least five-fold higher.[4]

Analyses across countries with data at the national level have many caveats. A central tenet of the Alma-Ata Declaration is that progress in health depends on many factors—ie, economics, education, nutrition, health system, and culture—and is closely linked to governance, social justice, and changes in other sectors.[1] Attribution of cause and effect over time at national level is particularly difficult with the wide range of factors that might have changed. Changes and possible associations could also be masked by shifts in definitions and data quality with time. Country-level analysis masks intra-country variation. Despite these caveats, we set out to

For the ***Progress of Nations and State of the World's Children*** **report** see http://www.unicef.org/publications/

assess progress in primary health care in countries since Alma-Ata, and identify common themes and lessons learnt from those that have overachieved or underachieved, particularly for pathways to build comprehensive and equitable primary health-care systems associated with mortality reduction.

Data inputs and methods

We used data from Countdown to 2015,[3] UN databases, mainly UNICEF,[5] and other sources for this analysis (webtable 1). We analysed data from 90 countries with a Gross National Income (GNI) per person of less than US$10 000 and at least 100 000 births per year, to focus on what works at scale in low-income and middle-income countries (figure 1). We assessed present life expectancy in relation to GNI per person and HIV/AIDS prevalence to identify overachievers and underachievers.

To assess changes in mortality with time, we further narrowed our focus on countries with a GNI per person of less then $5000 in 2006 (figure 1) and ranked these 80 countries according to their average yearly rate of reduction in mortality among children age less than 5 years from 1990 to 2005. We identified 30 countries with the best average yearly rate of reductions. For these countries, we assessed changes in total fertility rate and maternal mortality ratio as outcome measures.[6] We recognise that both selective and comprehensive primary health care entail a complex array of indicators. We selected immunisation coverage with three injections of diphtheria, pertussis, and tetanus (DPT3), and contraceptive prevalence rate as indicators of selective primary health-care implementation, and skilled birth attendance coverage as a marker of the development of a comprehensive primary health-care system. We also assessed equity with skilled birth attendance coverage across income groups because this indicator has the highest disparity according to income quintiles and therefore serves as a proxy for overall inequity in primary health-care services.[7,8] As indicators of intersectoral actions in support of primary health care, we used access to clean water and gender inequality in literacy. Government spending on health and education compared with defence was used as an indicator of commitment to social welfare.

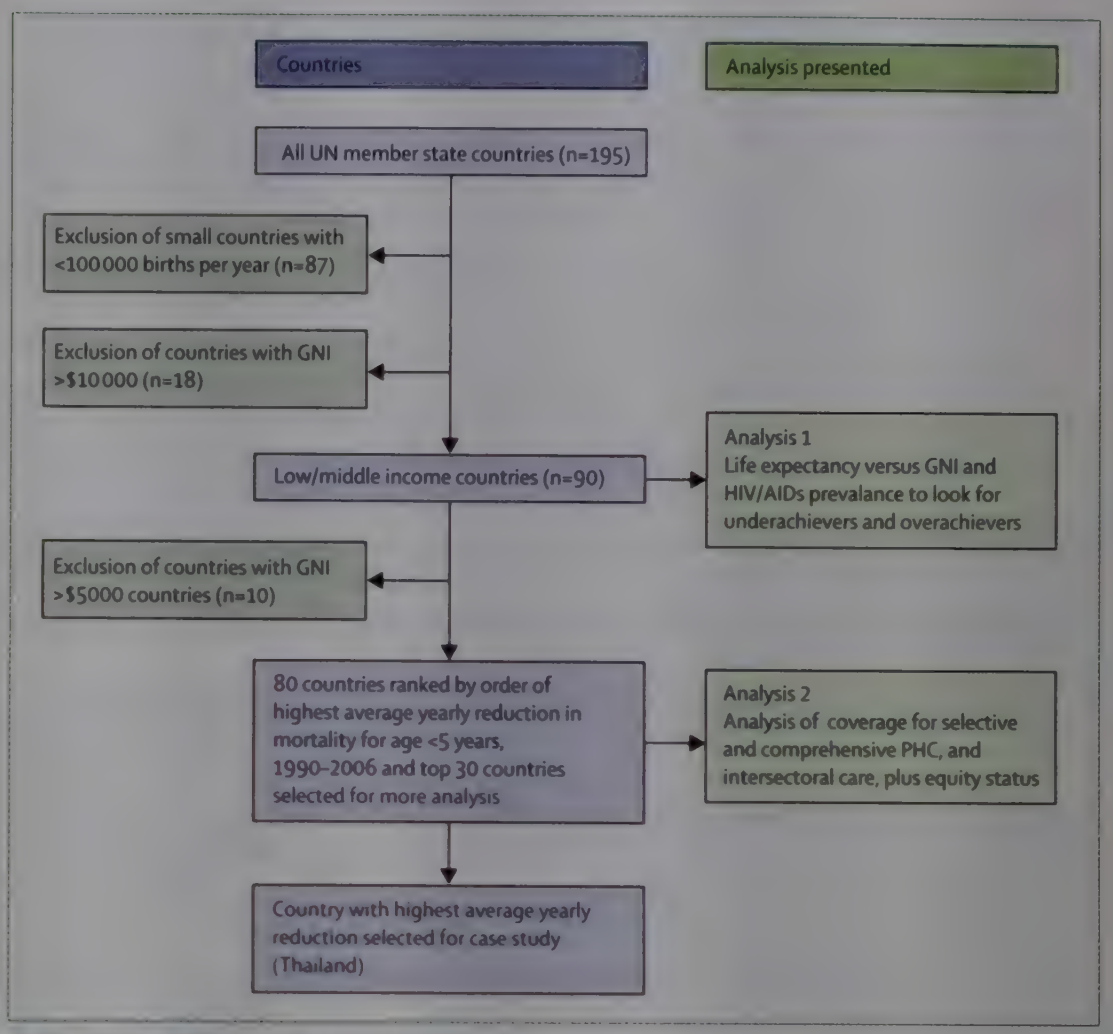
Countries
Analysis presented
All UN member state countries (n=195)
Exclusion of small countries with <100 000 births per year (n=87)
Exclusion of countries with GNI >$10 000 (n=18)
Low/middle income countries (n=90)
Analysis 1
Life expectancy versus GNI and HIV/AIDs prevalance to look for underachievers and overachievers
Exclusion of countries with GNI >$5000 countries (n=10)
80 countries ranked by order of highest average yearly reduction in mortality for age <5 years, 1990–2006 and top 30 countries selected for more analysis
Analysis 2
Analysis of coverage for selective and comprehensive PHC, and intersectoral care, plus equity status
Country with highest average yearly reduction selected for case study (Thailand)

Figure 1: **Flow diagram of countries included in the analyses**
GNI=Gross National Income per person. PHC=primary health care.

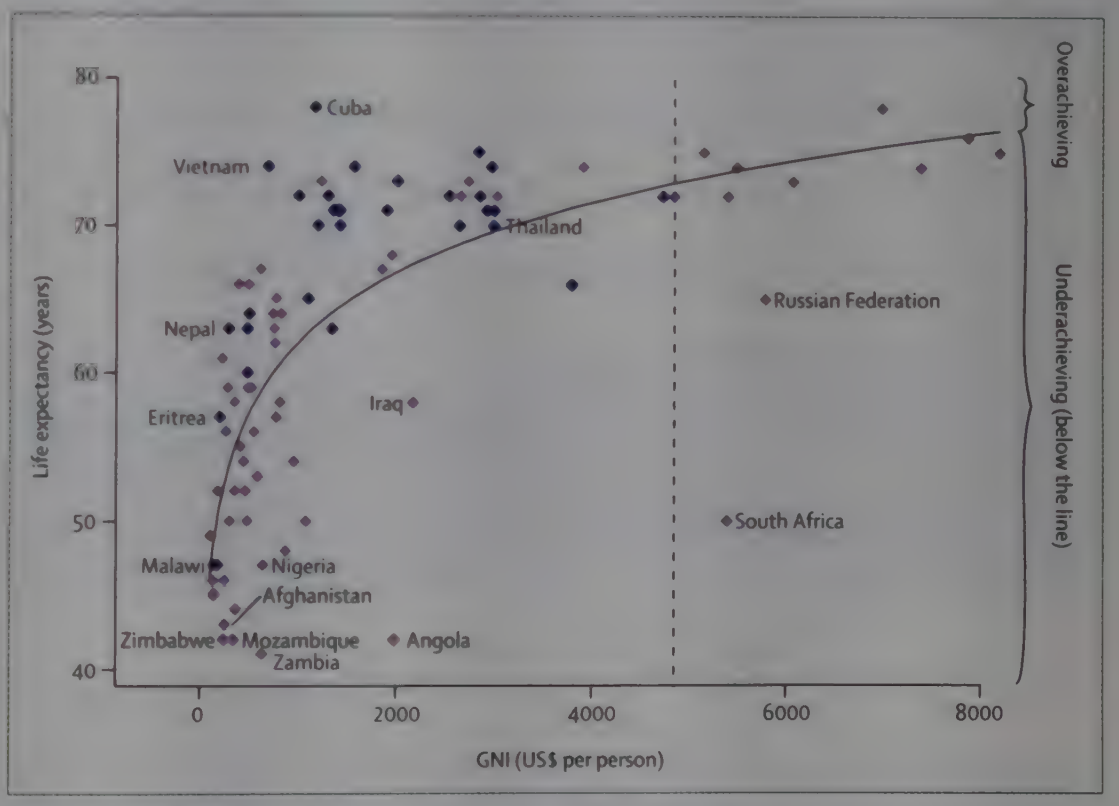

Figure 2: **Life expectancy in 90 countries with more than 100 000 births per year with Gross National Income (GNI) per person of less than US$10 000 in 2006**
Blue symbols are the 30 low-income countries listed in table 1. The fitted line represents the regression curve of life expectancy versus log GNI.

Overachieving and underachieving countries for life expectancy relative to national income

Figure 2 shows a strong association between life expectancy and GNI per person. Among the 90 low-income and middle-income countries, the highest life expectancy is 78 years in Cuba and the lowest is 41 years in Zambia, closely followed by 42 years in Zimbabwe, where life expectancy continues to decrease precipitously. Many countries with a life expectancy greater than that expected for GNI per person have had the most rapid reductions in mortality rates for children less than 5 years of age, which is unsurprising because reduced child mortality is a major component of increased life expectancy. Overachieving countries will be assessed in detail with the top 30 low-income and middle-income countries for mortality reduction because most of these 30 countries are above the regression curve in figure 2.

See Online for webtable 1

Lessons learned from underachieving countries and those in which primary health care has not been sustained

Although reviews of country success stories are more likely to be publicised, we can still learn from countries where life expectancy is less than that expected on the basis of the GNI. Four distinct categories can be identified among these underachievers.

The first group of countries—eg, Angola, Iraq, and Chad—are examples of countries affected by conflict, where the infrastructure has been damaged or destroyed and the conflict has had a direct effect on life expectancy. Modern warfare increases loss of civilian lives, especially women and children.[9] Data from Iraq and Angola draw attention to the substantial effect of collateral deaths due to increased infections,[10] malnutrition,[10] and other indirect links with conflict.[11,12]

The second group of countries—eg, South Africa and Zambia—are countries with very high HIV/AIDS prevalence where, in some cases, an inadequate or delayed response to the threat of disease can overwhelm otherwise well-functioning primary health-care systems. Unsurprisingly, HIV/AIDS prevalence shows a strong negative association with life expectancy. Together GNI and HIV/AIDS prevalence account for more than 70% of the variation in present life expectancy in the 90 low-income and middle-income countries. South Africa, with 20% prevalence, is a clear outlier in figure 2. However, once HIV/AIDS is accounted for, life expectancy in 2006, although still less than in 1990, is close to what would be expected based on changes in Gross Domestic Product and disease prevalence (figure 3). HIV/AIDS directly affects progress towards MDGs 4 and 5 in South Africa.[13] Health services are burdened by the increased workload of providing antiretroviral treatment for half a million of 6 million people with HIV, prevention of mother-to-child transmission, care for ill children, and services for tuberculosis and other complications. The emergence of multidrug-resistant tuberculosis in South Africa is an indication of a primary health-care system that is struggling to meet these challenges and that has high treatment default rates. The severity of the HIV epidemic is often blamed on an absence of effective political leadership. Additionally, the pre-existing weakness of primary health-care and community-based services has hampered an effective response.[14] The HIV/AIDS epidemic is now forcing a revitalisation of primary health-care and community-based services. In particular, community health workers are playing an important part in the provision of counselling, antiretroviral drugs, and home care, and the government is exploring the possibility of a new multipurpose community health worker cadre to reach the urban poor.

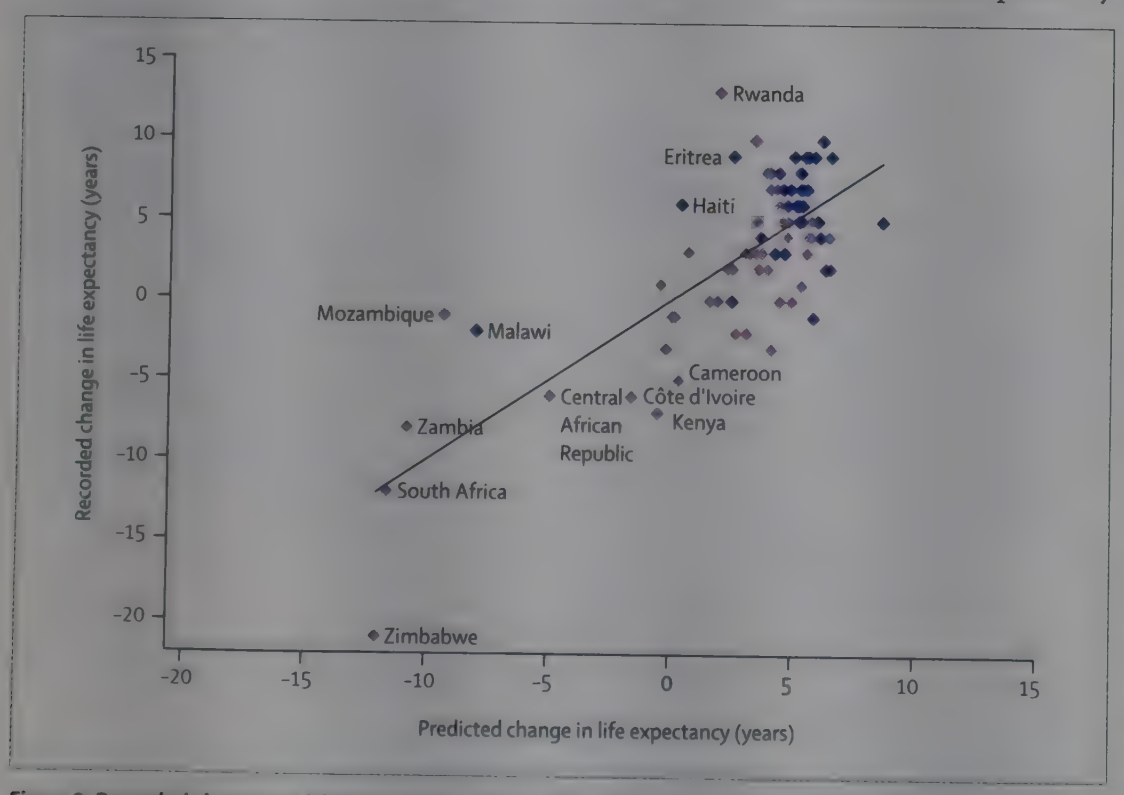

Figure 3: **Recorded changes in life expectancy during 1990–2006 versus expected change based on change in Gross Domestic Product (1990–2006) and HIV prevalence (2006)**

Graph based on jacknife regression analysis. Blue symbols indicate the 30 low-income countries listed in table 1. Any countries that are below zero on the y axis had a reduction in life expectancy between 1990 and 2006. The line indicates when recorded and predicted changes in life expectancies (based on HIV/AIDS and Gross Domestic Product per person) are equal. Those countries above the line are doing better than expected and those below the line are doing worse than expected—eg, Malawi is predicted to have had a reduction in life expectancy of about 7 years, whereas in practice life expectancy has decreased by 2 years during 1990–2006; therefore the recorded values are better than the predicted values. Five countries (Somalia, Iraq, Libya, Afghanistan, and Serbia) were excluded because of missing data for Gross Domestic Product change.

In countries with a high HIV/AIDS prevalence, the disease is a serious challenge to health systems, especially primary health care. However, some countries, despite very high HIV/AIDS prevalence, have succeeded in improving health outcomes. Malawi is one notable example with a disease prevalence of 14% and a very low GNI of $170 per person. Although, some reduction in life expectancy has occurred in the presence of the HIV/AIDS epidemic (figure 3), it is less than might be expected compared with other countries. Malawi is one of only two African countries in the top 30 countries with child mortality reduction (table 1). Rwanda is another country that is doing much better than expected on the basis of HIV/AIDS prevalence and GNI, and despite major civil disturbance in the past (figure 3). Mozambique, Eritrea, and Haiti are also doing well. Of note, several southern African countries including Lesotho, Swaziland, and Botswana, with very high HIV/AIDS prevalence were excluded from our analyses due to their small populations.

The third group includes countries with specific adult mortality challenges despite low child mortality rates, notably some former Soviet countries that have had a reduction in adult, particularly male, life expectancy. In Russia, Tajikistan, and Kazakhstan, life-expectancy rates are low (figure 2) despite low child mortality rates, and are affected by excess adult mortality rates, particularly for men; alcohol, tuberculosis, violence, and suicide, and chronic diseases are important contributory factors. Importantly, primary health care in the Soviet Union was strong, and achieved high coverage but was neglected with the breakup of the Soviet Union. Key public-health markers, such as immunisation coverage, have decreased

and health investment has mainly been in cities. Consistent commitment is needed to ensure that primary health care reaches the whole population.

The fourth group includes countries with governance challenges and marked societal inequity—eg, Zimbabwe, Nigeria, and Cameroon—available resources for health are not spent effectively (figure 3). In Nigeria, even child immunisation coverage remains very low, with DPT3 coverage at 54%, which is much lower than the African average of 72%. Yet for the richest families in Nigeria, full intensive care of any sort is available. Progress in improvement of life expectancy, and reduction of child and maternal mortality has been extremely slow despite a strong primary health-care national champion in the former minister of health, Olikoye Ransome-Kuti, and the availability of an appropriate cadre of workers—community health extension workers—initiated more than two decades ago. Effective primary health care requires reliable decentralised management and accountability to the community served, both of which are a challenge in Nigeria because of the sheer size of the country with 774 districts, independence of each state from federal policy, and pervasive corruption at all levels of the public system, including the health system. In Transparency International's corruption index, Nigeria had been ranked as the most corrupt nation for several years but in 2007 it ranked 147 among 179, which is perhaps a sign of hope.[15]

30 low-income countries with the most progress

We selected the top 30 low-income countries with the greatest average yearly reduction in mortality among children under the age of 5 years (1990–2006) as a marker of progress for primary health care (table 1). Together these 30 countries account for 2·6 billion people, more than 40% of the world's population but only 1·43 million deaths of children less than 5 years of age, about 15% of the worldwide total (table 1). The first 15 countries in the list are predominantly in southeast Asia, north Africa, and Latin America, with the exceptions of Nepal and Sri Lanka. Sub-Saharan Africa is represented only by Eritrea and Malawi. Although all these countries have shown progress in reduction of child deaths, not all are officially on track for MDG 4. Some African countries with recent progress in reduction of mortality in children less than 5 years of age, such as Tanzania,[16] still have a low average yearly rate of reduction during the 16 years from 1990 to 2006 and so are not in the top 30 list of countries. Although the 30 countries have substantially reduced mortality rates for children aged less than 5 years, several (notably Malawi and Nepal) still have very high estimated maternal mortality ratios, and for many countries the neonatal mortality rate has not decreased as quickly as that for children less than 5 years of age. A wide variation in coverage of primary health-care services exists even among the 30 countries that are making progress (table 2; for more detail see webtable 2). Almost all these countries have high immunisation coverage, with a median coverage of 91% (range 53–99%) for DPT3, with only Haiti at 53% having low coverage. Contraceptive (modern method) use differs from other indicators in that the target is not 100% coverage but the median coverage of 62% is much higher than that (ie, 29%) for the 68 priority countries in Countdown.[3] However, Haiti, Nepal, Laos, and the African countries included still have low contraceptive coverage of less than 50%. The median skilled birth attendant coverage for these well-achieving countries at 75% is much greater than that for the Countdown[3] countries (53%) but this marker has the most variation (ranging from 19% to 100%). The coverage

See Online for webtable 2

	Countries and territories*	Total population in thousands (2006)	Average yearly reduction in mortality (1990–2006)	Mortality rate for children <5 years† (2006)	Number of deaths for children <5 years (2006)	Estimated maternal mortality ratio (2005)‡
1	Thailand	63444	8·5%	8	7000	110
2	Vietnam	86206	7·1%	17	28000	150
3	Peru	27589	7·1%	25	15000	240
4	Brazil	189323	6·5%	20	74000	110
5	Indonesia	228864	6·2%	34	151000	410
6	Syria	19408	6·2%	14	7000	130
7	Egypt	74166	6·0%	35	64000	130
8	Sri Lanka	19207	5·6%	13	4000	58
9	Nepal	27641	5·5%	59	47000	830
10	Morocco	30853	5·5%	37	23000	240
11	El Salvador	6762	5·5%	25	4000	170
12	Ecuador	13202	5·4%	24	7000	210
13	Tunisia	10215	5·1%	23	4000	100
14	Dominican Republic	9615	5·0%	29	7000	150
15	Laos	5759	4·9%	75	12000	660
16	Bangladesh	155991	4·8%	69	277000	570
17	Honduras	6969	4·8%	27	5000	280
18	Iran	70270	4·7%	34	48000	140
19	Bolivia	9354	4·5%	61	16000	290
20	Kazakhstan	15314	4·5%	29	8000	140
21	Eritrea	4692	4·3%	74	14000	450
22	Guatemala	13029	4·3%	41	18000	290
23	Philippines	86264	4·1%	32	73000	230
24	Turkmenistan	4899	4·1%	51	6000	130
25	Haiti	9446	4·0%	80	22000	670
26	Nicaragua	5532	4·0%	36	5000	170
27	Paraguay	6016	3·9%	22	3000	150
28	China	1320864	3·9%	24	415000	45
29	Cuba	11267	3·9%	7	1000	45
30	Malawi	13571	3·8%	120	68000	1100
Total		2545732			1433000	

Countries are ranked according to progress for Millennium Development Goal 4. *Countries with Gross National Income greater than US$5000 per person and less than 100 000 births per year were excluded. †Per 1000. ‡Per 100 000.

Table 1: **30 low-income countries with the highest average yearly rate of reduction in mortality among children less than 5 years of age (1990–2006)**

rates for Nepal, Bangladesh, and Laos are all still very low, about 20%.

In terms of intersectoral markers, access to clean drinking water ranged from a median of 67% in the countries with selective primary health care to a median of 92% in those with comprehensive primary health care, but almost all the countries showed ongoing urban or rural inequity for this indicator (table 2). The countries with comprehensive primary health care almost had gender equity for education. In countries with selective primary health care, female literacy is a median of 78% of male literacy, but this value is greater than the average of 68% (female literacy as a percentage of male literacy) for the least developed countries. Many Latin American countries with comprehensive primary health care have high levels of social-sector spending compared with defence.[5]

Three groups of countries with varying patterns of primary health-care coverage can be identified (table 2):

	Selective primary health care (skilled attendance <50%)	Primary health care in transition between selective and comprehensive (skilled attendance 50–80%)	Comprehensive primary health care (skilled attendance >80%)
Countries	Nepal, Laos, Bangladesh, Guatemala, Eritrea, Haiti	Peru, Indonesia, Syria, Egypt, Morocco, Ecuador, Honduras, Bolivia, Philippines, Nicaragua, Malawi	Thailand, Turkey, Vietnam, Brazil, Sri Lanka, El Salvador, Tunisia, Dominican Republic, Iran, Kazakhstan, Turkmenistan, China, Cuba
Demographic status			
Total population (in thousands)*	1839996	489178	216558
Estimated adult (≥15 years) HIV/AIDS prevalence rate	0·9	0·25	0·35
Economic status			
GNI per person (US$)	480	1375	2690
Population living on <$1 a day	27%	15%	10%
Maternal outcomes			
Maternal mortality ratio	365	150	67
Total fertility rate in 1970	6·2	6·5	6·3
Total fertility rate in 2005	3·6	3·1	2·2
Child outcomes			
Mortality rate for children <5 years in 1970	229	172	127
Mortality rate for children <5 years in 2005	72	35	23
Mortality rate for children <5 years MDG 4 target for 2015	49	26	19
Average yearly rate of reduction to MDG 4 recorded in 1990–2006	4·6%	5·4%	5·3%
Average yearly rate of reduction to MDG 4 needed by 2007–15	4·1%	2·6%	2·5%
Number of child deaths in 2005*	390000	423000	620000
Selective primary health-care coverage markers			
Immunisation of 1-year-old children with DPT3	84%	88%	98%
Contraceptive prevalence	38%	61%	72%
Health system and equity markers			
Skilled attendant at delivery	23%	67%	96%
Skilled attendant at delivery (poorest people)	7%	36%	93%
Skilled attendant at delivery (least poor people)	68%	95%	99%
Intersectoral markers			
Total population using improved drinking water sources	67%	85%	90%
Urban population using improved drinking water sources	81%	95%	97%
Rural population using improved drinking water sources	65%	69%	78%
Adult literacy†	79%	88%	96%
Routine EPI vaccines financed by government	14%	98%	100%
Governance for health marker			
Central government expenditure allocated to health	7%	7%	6%
Central government expenditure allocated to education	17%	15%	10%
Proportion of central government expenditure allocated to defence	10%	7%	6%
Overseas development assistance per person	$35·40	$17·80	$7·90

Data are median values, unless otherwise indicated. GNI=Gross National Income. MDG=Millennium Development Goal. DPT3=diphtheria, pertussis, and tetanus. EPI=expanded programme on immunisation. All data are the most recent available and most refer to around the year 2005. See webtable 2 for detailed sources and years. *Not median value. †For women as a percentage of male literacy.

***Table 2*: Summary of the 30 low-income countries with the highest average yearly rate of reduction in mortality for children less than 5 years of age (1990–2006)**

selective (with high immunisation, assessed by DPT3 coverage) but with low comprehensive care coverage (skilled birth attendance <50%); primary health care in transition between selective and comprehensive (assessed by skilled birth attendance of 50–80%); and comprehensive primary health care (assessed by skilled birth attendance >80%) with varying levels of inequity in the provision of skilled birth attendance. These three groups provide a framework for assessment of the progress of primary health-care systems with time. A detailed analysis within the 30 low-income countries would be immensely valuable for understanding the broad patterns and possible mechanisms of progress. In this paper, we focus on the present coverage patterns and general long-term shifts in public-health policy for some of these 30 countries, selecting examples from each of the three groups.

Selective primary health care

For countries that started with selective primary health care, selective child survival interventions were often the entry point and formed the focus of the first child survival revolution epitomised by growth monitoring, oral rehydration, breastfeeding, and immunisation.[1] For six countries (Nepal, Laos, Bangladesh, Guatemala, Eritrea, and Haiti) the median GNI per person is only $480 and about a quarter of the population live on less than $1 a day (table 2). These countries are among the world's poorest, and for many instability is an additional challenge, yet progress has been made in reduction of mortality in children less than 5 years of age and total fertility rates, although maternal mortality ratio remains high. A key point to note is that these countries identified some highly effective, achievable interventions and strategies[17] and have consistently followed through on these to attain high coverage even for the poor. The high immunisation rates in these countries (except Haiti) might provide an opportunity to further increase contraceptive prevalence if postnatal family planning could be integrated with the 6 week immunisation visit. Skilled birth attendance remains low and for most of these countries has changed little in the past decade, indicating a mix of constraints from absence of midwives and access issues to cultural taboos against leaving home around the time of birth. This increase in skilled attendance is the next frontier for progress in these countries and might require innovation to achieve supply (eg, accelerated midwifery training) and demand (eg, conditional cash transfers for facility births and transport subsidies) as achieved by some of the countries further up in the list of 30 countries.

Bangladesh, which previously had high mortality, is an example of a country where high coverage of a selective range of interventions has reduced mortality substantially. Large community-based non-governmental organisations, notably BRAC, have succeeded in teaching people about oral rehydration throughout the whole country so that diarrhoea is no longer the leading cause of child death.[18,19] Other selective interventions, such as immunisation, vitamin-A supplementation, family planning, and short-course tuberculosis directly observed treatment are delivered by community workers at high coverage, in many cases through large community-based non-governmental organisations with the support and encouragement of the government. However, comprehensive health-system coverage has not increased to the same extent, although paradoxically there have still been major reductions in maternal mortality ratio despite low skilled birth attendance.[20]

Eritrea has focused on a few key interventions such as immunisation and has used community-change agents to deliver these interventions. This approach has been linked to consistent and impressive reductions in child mortality during 20 years despite war and harsh socioeconomic conditions. In Eritrea, improved comprehensive primary health care, as assessed by skilled birth attendance, is still low. Indeed, even contraceptive use is very low (8%). Maternal mortality ratio remains at 450 per 100 000 according to the latest UN estimates.[6]

Haiti, despite severe breakdown in governance, has achieved substantial child mortality reduction largely through the efforts of a network of non-governmental organisations working at the community level to deliver a selective range of services, in most cases bypassing ineffective government facilities. A high level of external assistance has made fairly high coverage possible, often through non-governmental and faith-based organisations. The non-governmental organisation sector applies some essential features of primary health care, including focus on priority conditions, use of community workers, strong preventive services, and simplified case management protocols.

Nepal has focused on selected interventions, and used these to build up a strong district-based network of services with community health workers in villages, supervised by extension workers in health posts, who are in turn affiliated to district hospitals. Community-case management of pneumonia is provided by community health workers,[21] and the government is presently working with partners to test the addition of neonatal sepsis case management.

Primary health care in transition between selective and comprehensive

Egypt and Malawi are examples of countries that started with a focused approach to the delivery of a few interventions but have subsequently moved towards the delivery of a wide range of interventions, working towards a comprehensive health system. *The Lancet* Mexico Series coined the phrase "diagonal approach" to describe this progress with time.[22]

In Egypt, maternal, newborn, and child health was prioritised, starting in the 1980s after Alma-Ata. The initial focus was on a selective child health and family planning package; immunisation, vitamin-A supple-

mentation, oral rehydration solution use, and contraceptive use are at high coverage now. Egypt has made progress in scaling up skilled birth attendance, now reaching about three-quarters of the population, but has a major equity gap with only 31% of the poorest quintile accessing skilled care compared with 94% of the richest quintile. Of 68 countries identified in Countdown, Egypt is one of only two where postnatal care within 2 days of birth is received by more than 25% of the population.[3] Disparity reduction, with efforts to reach the poor, is a top priority and will need continued support from community-level workers.

Malawi is one of few African countries with a national cadre of extension workers, sustained since the 1980s. The use of health surveillance assistants, mainly men, helps to explain how Malawi with a critical human resources crisis

***Panel 1:* Thailand's progress in primary health care and maternal, newborn, and child health**

Background and approach taken

In the early 1970s, Thailand prioritised primary health care based on the following principles:

1 *Involvement of the community, bringing care close to families*

Community volunteers play an important part, promoting behaviour change and providing selected maternal, newborn, and child health, nutrition services, and promoting immunisation. The country still has more than 800 000 health volunteers for primary health care. Thailand was one of the first countries to offer injectable contraceptives at community level, contributing to a high level of contraceptive prevalence even by the 1980s. Community women's groups were part of the health and development process, and later involved in microfinance schemes. During the 1990s, bolstered by a stronger economy, universal clean water and sanitation were achieved.

2 *Investment in building an effective district health system*

In the 1980s, government policy supported development of the District Health System. By the 1990s, each district, typically with a population of 50 000, was served by a district hospital of 30–120 beds operated by a team of qualified health professionals, linked to subdistrict health centres serving a population of 5000 and staffed by three to four paramedics and providing better geographical access to services especially for the rural poor. To help address the human resource gap, mandatory rural service was instituted in 1971.[26] All nursing, medical, dental, and pharmacist graduates had to serve at least 3 years in the rural district hospitals. In view of limited human resource production, the Ministry of Public Health trained nurses and other paramedics. To maximise cost-effective use of drugs, the government has promoted an essential drug list using generic drugs and promoted the manufacture of drugs in the country, notably for HIV/AIDs.

3 *Attention to protecting the poor from unaffordable health costs*

In 1975 the poorest families were exempted from payments for health services, and this exemption was increased with time to include the elderly and those with disabilities, whereas maternal, newborn, and child health care and immunisation were provided free of charge from the 1970s. Low-income families who were not poor enough to be exempted could join the voluntary public subsidised insurance scheme. Public sector employees have health costs covered, and since 1991 private sector contributions to the Social Health Insurance scheme have been mandatory. The EQUITAP project, indicated that Sri Lanka and Thailand had the lowest out of pocket expenditures for health care amongst the Asian countries evaluated.[27] Since the universal coverage policy was introduced in 2001, the overall incidence of unaffordable expenditure has been reduced to a very low level.[28]

For the **EQUITAP project** see http://www.equitap.org

4 *Increased use of data for decision making in public health*

Use of data for public health decision making has been an important ingredient. Detection of increases in HIV/AIDS prevalence in the 1980s prompted effective responses such as condom promotion, and scale-up of prevention of mother-to-child transmission strategies. National HIV prevalence remains low (1·4%).

Results

Since Millennium Development Goal baseline year 1990, Thailand has demonstrated the highest average yearly reduction in mortality for children younger than 5 years (8·5% per year) and has substantially reduced its maternal mortality ratio (now at 110 per 100 000), and is on track for Millennium Development Goals 4 (child survival) and 5 (maternal health) (table 2). The total fertility rate is also low. Very high coverage of immunisation and skilled birth attendance was achieved in the 1990s with low inequity.[6]

Sustainability and status now

With steady progress in reducing the maternal mortality ratio and mortality among children younger than 5 years, more focus on newborn mortality reduction, which now accounts for 50% of deaths in children less than 5 years of age is required. HIV/AIDS prevention and treatment are at high coverage even for poorer communities. Major challenges ahead for primary health care include demographic and rapid epidemiological transition towards chronic disease. Although the Asian economic boom of the 1980s contributed to Thailand's primary health-care success, much of the foundation was laid through consistent progress when the country still had a very low per person income.

(only four national paediatricians in the whole country and more than half of midwifery posts vacant) has maintained and even increased coverage of some key interventions, and had substantial reductions in mortality among children less than 5 years of age. Indeed the health surveillance assistants provide antiretroviral drugs for HIV/AIDS and short-course directly observed treatment for tuberculosis,[23] and are in the process of adding further maternal, newborn, and child health tasks, notably postnatal home visits. These community workers are all affiliated to fixed health facilities, staffed by nurses, from which referral to district hospitals is made easy. 40% of health facilities are managed by faith-based organisations and non-governmental organisations, working closely with government to assure a uniform set of essential services and quality. As a result, skilled birth attendance coverage is now almost 60%, one of the highest in sub-Saharan Africa though inequity still remains high (table 2), and caesarean coverage has increased largely through the use of non-physician clinicians.[24] However, according to UN estimates, the maternal mortality ratio is still very high at 1100 per 100 000 (table 1).[6] Malawi has received a high level of overseas development aid of $42 per person, which might have contributed to progress. Distribution through health-sector planning linked to the essential health plan might have increased effectiveness of this aid. Other important components for progress have been the national Essential Health Package, with strong government leadership and buy in by donors and non-governmental organisations. Strong managerial skills at district level and improvement of drug supplies also play a part.

Indonesia has built a primary health-care infrastructure progressively in the past 30 years, initially establishing a health centre in every county in which village volunteers are trained to supervise village activities (posyandus). These volunteers focused on nutrition, child illness, family planning, and, later, immunisation. After achievement of a high level of contraceptive use and immunisation coverage, they initiated a mass effort to provide a fully trained midwife for every village, substantially increasing the access to skilled delivery assistance sustained by private practice of these midwives.[25] The poorest, however, are still left behind the better off with only 21% versus 89% skilled delivery assistance. Meanwhile, the posyandus have become increasingly neglected and some primary health-care coverage is decreasing. As systems develop high-level services, attention is still needed to maintain the services near to the community.

Comprehensive primary health care

We identified 14 of 30 countries with comprehensive primary health care based on coverage of skilled attendance above 80%. Thailand, which has had the highest average reduction in mortality for children younger than 5 years of 8·5% per year for 1990–2006, started with a comprehensive primary health-care approach, and has made progress in addressing inequity (panel 1). Thailand prioritised maternal, newborn, and child health even before Alma-Ata, and beginning with community workers was able to increase coverage for immunisation and family planning interventions, and nutrition promotion. The government then invested in district health systems, which provided a foundation for transition to comprehensive coverage of maternal, newborn, and child health care and increased to cover all other essential services, and safeguarded the poor with national coverage of pro-poor health insurance. Innovative approaches to human resource production, the application of a national essential drug list, and national production of generic drugs also helped to strengthen the system with time.

Cuba is an instructive example of a country that had to make a crisis response to health after the 1959 revolution, not only for ideological reasons, since health was declared a human right for all citizens, but also for practical reasons since 3000 doctors left the country and a heavy dependence on imported medical supplies from the USA was no longer an option. Within a very short time new medical schools were established and a 2 year nursing course was started. In the meantime, while human resources for health were being replenished, the government ran mass immunisation campaigns, reaching high coverage, leading to elimination of polio, measles, and rubella before most other countries in the region. Health surveillance was rigorous, and maternal and child deaths were reported to the highest levels of government. In the 1980s, integrated polyclinics were established in all communities, enduring intensive continuity of care. For example, in the first year after birth, a mother and baby in Cuba receive 15 home visits from their local family doctor, focused on preventive care in the family context.[29] Cuba's mortality rate for children younger than 5 years is less than that for the USA.[5]

The barefoot doctors of China were once the most famous examples of primary health care, and probably the most influential example at the time of Alma-Ata.[1,18] They were present in almost all communities, integrated traditional and modern care, were paid for by communes or work brigades, and had effective referral connections through county and province to the highest specialty centres in the country. However, with the end of the communes, the barefoot doctors had to rely on fees for service, leading to extensive overmedication, neglect of preventive services, and rapid collapse of the system. The country has largely succeeded in establishing a comprehensive health system along traditional lines with hospitals and clinics. High coverage has been achieved for urban populations but inequity is still high with big gaps in health outcomes between urban and rural areas, and the possibility of catastrophic health expenditure and further impoverishment are real problems for the poor.[30] Would the urban to rural and

rich to poor gaps be reduced if the barefoot doctors were still in practice and working within the new system, perhaps with gradual upgrading?

Progress in other countries

Although Mexico has a GNI per person of $7870 and hence was excluded from the countries assessed (figure 1), many important lessons about primary health care and health sector progress can be learned from it.[31] The early focus was on the standard selective child survival package with emphasis on growth monitoring, oral rehydration, breastfeeding, and immunisation; elimination of polio, diphtheria, and measles; and substantial reductions in diarrhoea mortality rates. Nutritional status of children improved greatly. The range of interventions increased with time, bridging clinics and homes, and then complex systems were strengthened, while the poor were protected through social health insurance.[22] Leadership and consistency in policy making, along with investments in institutions and human resources strengthening, were among the reasons identified for progress.

Some large countries are notable by their absence from the list of 30 low-income countries with the most progress for child mortality. India has huge challenges but success within some of its states—notably Kerala and Tamil Nadu—provide important examples of primary health-care success[4] in populations larger than many African nations. These states are characterised not only by high coverage of services but also by a stronger level of accountability of government workers to communities than in many of the areas that do worse. Pakistan is an example of a country with large-scale primary health-care programmes and multipurpose community health workers where effects on mortality and life expectancy are not discernable. This discrepancy might indicate poor programme quality, inadequate links with an effective health system,[32] or complexity in measurement of programmatic effect.

Pathways to progress for primary health care

Our analysis of 30 countries, selected on the basis of child mortality reduction, offers many lessons for the pathways to scale for maternal, newborn, and child health, and for primary health care generally. Many of the same principles apply to the care of chronic disease, HIV/AIDS, and tuberculosis, particularly with a selective start to build and then extend the system. Even for countries with very low income and a quarter of population living on less than $1 a day, reduction of mortality is possible by provision of prioritised highly effective services at high coverage. However, further gains, especially for conditions that are dependent on curative case management or complex care (such as obstetric services), depend on progression to comprehensive primary health care with a reliable referral system linking to functioning facilities. Among these 30 countries, Vietnam has achieved the comprehensive primary health-care level with a GNI per person of less than $1000 compared with most of the countries in the progressing group that have a GNI per person $1000 or more; Malawi is a notable exception with a GNI per person of $170. Panel 2 summarises characteristics we noted in many of the successful country examples. These attributes were present in many well-achieving countries and absent in many of the underachieving countries; however, statistical comparisons are not available for most of these characteristics.

Although economic growth and good governance are helpful, what is achievable despite the challenges is remarkable. We are encouraged by this country analysis in that at least half the 30 countries have one or more major constraints. Many have very low income—in the selective primary health-care group, a quarter of families live on $1 a day or less and the median GNI per person is $480. Malawi has very high HIV/AIDS prevalence (14%), and Haiti has moderate HIV/AIDS prevalence (4%). Haiti, Bolivia, Nepal, Sri Lanka, and other countries have had major civil unrest. Bangladesh ranks 162 among 179 countries in Transparency International's corruption index.[15] Key strategies in these countries are an agreed national essential health package with defined priorities with links to the not-for-profit sector, non-governmental organisations, and other service providers in the system.

The three stages of primary health care identified here (selective, in transition between selective and comprehensive, and comprehensive) fit with other analyses of phased health-system development.[8] However, not every country needs to pass through these stages. In some cases—notably in the oil-rich countries of the Middle East—a big jump in health-care provision by building hospitals and hiring staff was possible without first going through the process of building up a system in poor and hard-to-serve communities with resticted resources.

For most of the countries in the selective primary health-care group, health extension workers or community health workers have contributed to the achievement of high coverage of the selected interventions. 10–20 years ago, many countries in the comprehensive group were very dependent on such workers, but have now moved towards facility-based services. In Indonesia, thousands of community midwives (bidan desa) have been trained to ease the transition towards skilled care.[25,33] The experience of Sri Lanka is instructive, in that improvement of rural health centres staffed by competent midwives reduced the need for beds in urban referral hospitals with large cost savings,[34] and reduced family opportunity costs with care being near to home.

Progression towards a comprehensive system can occur while massive inequities in coverage remain. In 11 of 21 countries (including Indonesia) with suitable data, skilled attendance coverage is twice as high in the richest compared with the poorest quintiles. In Vietnam, with high overall skilled delivery coverage (88%), and 100% for the richest quintile; coverage in the poorest quintile is still less than 60%. Remarkably, Thailand does not have

any notable inequity in skilled attendance, with apparently 100% of the poorest individuals accessing care (webtable 2). Panel 1 highlights some of the strategies that could have led to this achievement, including pro-poor financing and insurance schemes.

Although the technical health elements of primary health care are increasingly well established,[17] many systems have not worked adequately or at all due to poorly developed management systems, unaccountable and unresponsive staff, chronic underfunding, and absence of attention and investment.[35] As shown by Thailand and Nepal, but true of many of the 30 countries, one key to success is a strong district health system, able to use data for appropriate action.[35]

Good governance is linked to progress for health and development. Although the proportion of government spending allocated to health is low (median of 7% [range 1–23%]) for the 30 countries, social-services expenditure, for example on education, is high and that for defence is low (webtable 2). Some underachieving countries allocate up to a third of government spending to defence.[36] The Alma-Ata Declaration recognised the interconnectedness of social, environmental, educational, and economic factors with health.[1] Microcredit to small groups of women in Bangladesh has been proven to enhance child survival and nutrition, perhaps even more than the health services have.[37,38] Clean and adequate water supplies were central to the health revolution in China in the 1960s,[18] Indonesia in the 1980s, and Bangladesh in the 1990s, yet they remain underdeveloped in many of the poorest areas of countries with high mortality[19] and in the rural areas of these 30 countries (webtable 2). Environmental factors, such as poor urban housing quality, low occupational safety, and deforestation, with effects on water and agriculture, certainly contribute to ill health.[39] However, they are difficult to measure at the national level, and hence the quantification of their contributions is a challenge.

In terms of overseas development assistance per person, a clear inverse association is noted for the three groups of countries; those with comprehensive health systems in place receive a median of $7·9 (IQR 1·33–22·09) per person; those in the middle group receive $17·8 (11·03–62·36) per person; and the countries still with selective primary health care, receive $35·4 (15·43–54·52) per person. At least overseas development assistance seems to be allocated so as to redress intercountry disparity.[40]

Further assessment and analysis

We believe our analysis of overachieving and underachieving countries has drawn attention to factors that help or hinder national progress for primary health care and indeed for health outcomes. However, many questions remain unanswered. Perhaps some of these questions cannot be addressed successfully through quantitative, multicountry statistical analyses of progress with time. Such analyses are associated with several difficulties, including measurement error (or important factors not measured at all) compounded by the strong correlations between many of the factors of interest,

***Panel 2:* Composite lessons learned from countries that are progressing**

A ccountable leadership, consistent national policy progress with time. For example, development of an integrated national health plan including primary health care and maternal, newborn, and child health with identified human resources and defined strategies to reach underserved populations. Consistency in major health policies, even when political parties change. Social development and good governance are strongly linked with progress towards a comprehensive health system. Consistent investment in health and the social sector, both government and donors, is important. For very low-income countries, donor aid, especially if linked to national plans or effective large-scale non-governmental organisation partners, is a key ingredient.

B uilding coverage of care and comprehensive health systems with time. Although a single right way does not exist, key factors in these countries include prioritisation of high-effect interventions to start with, integrated service delivery and building on each programme, moving from selective primary health care to an effective continuum of care in a comprehensive health system. Increase in human resources and skill levels with time and a willingness to innovate, including delegation to community and extension workers, and short training courses (eg, accelerated midwifery training) followed by in-service upgrading of skills. Attention to essential drugs and appropriate technology for health, development of local generics when feasible.

C ommunity and family empowerment, involving the community both in health promotion and demand for care, with community cadres and extension workers for provision of curative care when appropriate. Especially in countries with restricted access to facility care or human resources for health crisis, community and family empowerment is a critical foundation for progress of both selective (eg, immunisation and family planning) and curative care (eg, case management of pneumonia).

D istrict-level focus, with data to set priorities for funding at district level and track results, identifying and redressing disparities. Creation of functional links at district level with private providers and non-governmental organisations so that referral distance is minimised for families, and services meet the same standards and have similar costs.

E quity priority, removing financial barriers for the poorest families, particularly for skilled attendance at birth, and protection against unaffordable health costs. Systematic use of data to identify inadequately served populations and find solutions to reach all families with essential primary health care and maternal, newborn, and child health care.

particularly the dominance of GNI. The possibility is that causal effects can be bidirectional—eg, to what extent does the strong association between total fertility rate and mortality for children younger than 5 years indicate reduced fertility leading to reduced mortality, and to what extent does this association suggest reduced mortality leading to reduced fertility? Many associated questions—eg, about aid effectiveness—require additional data and other analyses.

The landscape for assessment of global health and nutrition has changed greatly in the past 5 years with multiple new initiatives. The International Health Partnership, Global Campaign for the Health MDGs, Catalytic Initiative, and Global Alliance for Vaccines and Immunisation all promote support for health interventions that are central to primary health care. Advances in the control of HIV/AIDS, tuberculosis, and malaria are being made with support from worldwide initiatives,[41] and again primary health care can and should be central to delivery of these preventive and therapeutic services. Much remains to be learned from these accelerated programmes, and systematic assessment is essential to ensure their effectiveness and sustainability. A common assessment framework for the health MDGs will benefit all stakeholders;[42] use of common assessment approaches and core indicators, service provision, coverage, quality, cost, and health effect, will provide the best opportunities to improve our understanding of what is needed to build effective, sustainable primary health-care systems.

Health for all in every country—where will we be in 10 years?

30 years after Alma-Ata, many countries still have a high burden of disease with infections, such as high infection, malnutrition, and maternal and child health challenges, but also emerging chronic diseases, and high injury rates. Primary health care offers solutions and approaches to address these burdens but the increasing complexity threatens to overburden the health system. Our analyses indicate that most countries have made progress in increasing life expectancy; countries making most progress often have associated reductions in child mortality. With more than half of 30 low-income countries having major constraints to progress—ie, extreme poverty, political instability, conflict, or HIV/AIDS—this analysis offers hope that even in the most challenging circumstances progress can be made not just in service provision but also in saving lives. Some of these countries have done a remarkable job of delivering selective primary health-care services, subsequently adding more comprehensive, curative and facility-based interventions. The 14 countries identified furthest along the path towards a comprehensive and equitable health system have all benefited from strong, consistent government commitment to health. With the exception of Sri Lanka, all have had relative political stability during the past 15 years although several underwent major political change in the two decades before that (eg, Vietnam, Iran, Kazakhstan, and Turkmenistan). By 2018 and the fourtieth anniversary of the Alma-Ata Declaration will there be more countries with strong primary health care and progress towards "health for all"? Further analyses have the potential to yield important information. However, such information is only useful if it leads to investment and action to increase coverage and equity of services; to empower communities to make healthy choices.

Conflict of interest statement
We declare that we have no conflict of interest.

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Alma-Ata: Rebirth and Revision 5

Community participation: lessons for maternal, newborn, and child health

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See **Editorial** page 863

This is the fifth in a **Series** of eight papers about Alma-Ata: rebirth and revision

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Primary health care was ratified as the health policy of WHO member states in 1978.[1] Participation in health care was a key principle in the Alma-Ata Declaration. In developing countries, antenatal, delivery, and postnatal experiences for women usually take place in communities rather than health facilities. Strategies to improve maternal and child health should therefore involve the community as a complement to any facility-based component. The fourth article of the Declaration stated that, "people have the right and duty to participate individually and collectively in the planning and implementation of their health care", and the seventh article stated that primary health care "requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of primary health care". But is community participation an essential prerequisite for better health outcomes or simply a useful but non-essential companion to the delivery of treatments and preventive health education? Might it be essential only as a transitional strategy: crucial for the poorest and most deprived populations but largely irrelevant once health care systems are established? Or is the failure to incorporate community participation into large-scale primary health care programmes a major reason for why we are failing to achieve Millennium Development Goals (MDGs) 4 and 5 for reduction of maternal and child mortality?

Introduction

Soon after the Alma-Ata Declaration, arguments for selective rather than comprehensive primary health care dominated health system debates.[2] Policy makers in favour of selective primary health care argued that community interventions such as oral rehydration solution, immunisation, or vitamin A capsules could be targeted effectively at poor, albeit passive, recipients with immediate benefit. They recognised that community participation was important in supporting the provision of local health services and in delivering such interventions at scale, but believed that pilot programmes showing long-term benefits from more comprehensive community mobilisation had been much less successful when governments tried to take them to scale.

More recently the lack of progress with the Millennium Development Goals (MDG) and primary health care in many poor countries has encouraged those in favour of comprehensive primary health care to question whether the failure to address community care and participation effectively within health programmes is a major reason for poor sustainability and ineffective scaling-up of selective interventions of proven efficacy. The review of the WHO Integrated Management of Childhood Illness strategy reinforced these questions: "Delivery systems that rely solely on government health facilities must be expanded to include the full range of potential channels in a setting and strong community-based approaches. The focus on process within child health programmes must change to include greater accountability for intervention coverage at population level."[3]

A crucial policy question is whether specific community participation interventions aimed at women and their families have a direct effect on maternal and child health? If so, how do these interventions work most effectively, and how can they be taken to scale?

What are participation, mobilisation, and empowerment?

The closely related concepts of participation, mobilisation, and empowerment require definition. Participation has been used to indicate active or passive community involvement. In the past, mobilisation consisted of communities responding to directions given by professionals to improve their health. This process usually took the form of mass campaigns for immunisations where communities were passively involved as the setting where the interventions were implemented or the target of the specific intervention. More recently, health and development workers have begun to act as facilitators focusing on the process of health improvements as well as the outcomes. In this approach the facilitators support local communities to become actively involved—to participate—in both activities and decisions that affect their own health, either as a resource that can provide assets to address a health problem or an agent of change that uses its own supportive and developmental capacities to address its needs. In this paper we will discuss this more recent form of community mobilisation, which we define as "a capacity-building process through which community individuals, groups, or organizations plan, carry out, and evaluate activities on a participatory and sustained basis to improve their health and other needs, either on their own initiative or stimulated by others".[4]

Health programmes today often identify empowerment rather than participation as an objective. Empowerment

can be defined as the process and outcome of those without power gaining information, skills, and confidence and thus control over decisions about their own lives,[5] and can take place on an individual, organisational, and community level. Community mobilisation, by our definition, is a way to support this empowerment process and reach this empowerment outcome (figure 1).

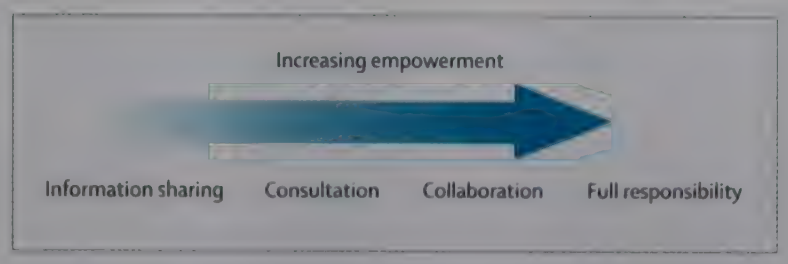

Figure 1: **From passive to active community participation**

What evidence led to Alma-Ata?

The Alma-Ata Declaration arose from evidence generated by the Joint WHO/UNICEF Study of Alternative Approaches to Meeting Basic Health Needs of Populations in Developing Countries under the leadership of Halfdan Mahler (Assistant Director-General at WHO, 1970–73) and Kenneth Newell (Director of Research in Epidemiology and Communications Science at WHO, 1962–72), who were influenced by the work of the Christian Medical Commission in Geneva and its growing commitment to community-oriented primary health care as the most appropriate approach to addressing the health needs of poor people.[6,7,8] This evidence revealed the successes of national health programmes in China, Cuba, Sri Lanka, Tanzania, and Venezuela as well as in subnational programmes in Guatemala, India, Indonesia, Iran, Kenya, and Niger, which all used community participation as a fundamental component of primary health care.

The Jamkhed Project in the state of Maharastra in India and the Kakamega Project in Western Kenya are examples of successful smaller-scale subnational pilot programmes where community mobilisation was a key intervention (panel 1).[10,11] Communities were assisted to identify their own problems, collect their own data, and implement their own solutions. These demonstration projects provided clear evidence of a dramatic effect on health but could not be easily replicated by governments on a larger scale. Once part of a national programme, bureaucratic rules and top-down directives changed the nature of community participation and heavy donor support emphasised performance targets rather than the unhurried process necessary for engagement with communities. Miriam Were, director of Kakamega, lamented that "officials and international experts could not understand that successes had arisen from the process, not from the setting of performance targets, and that the forward momentum had been generated from within the community and not from external financing".[11]

The failure to scale-up Jamkhed, Kakamega, and other similar projects through national governments contributed to a move away from participatory approaches to primary health care. Since 1990 the focus of child survival efforts has been on increasing the coverage of health commodities with proven effectiveness—such as oral rehydration solution for diarrhoea,[12,13,14] cotrimoxazole for childhood pneumonia,[15,16] vitamin A supplementation,[17,18] insecticide-treated bednets,[19,20] and vaccinations.[21] At the same time, maternal survival efforts also moved away from community approaches focusing on traditional birth attendants, which lacked clear evidence of effectiveness, to efforts entirely focused on strengthening district hospital midwifery and obstetric care services and health systems.[22,23]

These approaches to the diseases of poverty proved more saleable to policy makers for two main reasons. Firstly, the clear-cut and rapid public health gains shown by these approaches fitted well within the new culture of evidence-based medicine. Secondly, the scalability of distribution of these approaches seemed intrinsically easier and less expensive than more long-term comprehensive primary health care approaches involving community mobilisation despite strong evidence supporting their effectiveness and affordability.[24]

What is the effect of community mobilisation on maternal, newborn, and child health?

Progress towards MDGs 4 and 5 in the poorest countries has remained slow in high-mortality settings.[25,26] Between 1990 and 2005 there was no substantial change in maternal mortality in sub-Saharan Africa, and of the 68 priority countries targeted for child survival improvements, 41% were deemed to have made insufficient progress and 38% made no progress.[26] Additionally, in 11 African countries there were reversals in under-5 mortality rates in the same period.[25] The evident ineffectiveness of existing programmes and conclusion that this may in part be due to the lack of community involvement has led to a renewed focus on community mobilisation strategies for maternal, newborn, and child survival.[3]

Most studies of community mobilisation interventions have investigated the effectiveness of specific interventions targeted at a passive recipient community—the old style of community mobilisation (for example, breastfeeding promotion, diarrhoea prevention and treatment, growth promotion,[27,28,29,30] promotion of complementary feeding after 6 months of age,[31] treatment of severe acute malnutrition[32] and pneumonia prevention and treatment[33,34,35]). Far fewer studies have investigated the effectiveness of community mobilisation interventions, either on their own or in combined packages with other interventions, where the community provides the resources and is the active agent of change (table). In Ethiopia a cluster randomised controlled trial (cRCT) showed that mobilising women's groups to effectively recognise and treat malaria at home led to a

***Panel 1:* Projects in rural India and Kenya which influenced Alma-Ata**

Jamkhed Project (1970 to date)

In 1970, Raj and Mabelle Arole, two doctors, started a primary health care programme in Jamkhed, a rural area in Maharashtra state in India.[9,10] The project used a participatory approach to bring villages together and establish farmers clubs. These clubs identified problems facing the community and chose to focus on improvements to water supplies and sanitation. As the clubs evolved they became women's development organisations and implemented solutions such as: identifying women to be trained as health workers; funds for women with a household health emergency or food crisis; keep village clean drives; literacy programmes; advocacy for encounters with bureaucracy; and micro-credit schemes. The programme expanded to other villages, eventually covering a population of more than 250 000. Over the first 20 years (1972–1992) the project showed a reduction in infant mortality rate from 176 to 19 per 1000, and a birth rate decline from 40 to 20 per 1000.[10] Additionally, rates of antenatal care, safe delivery, and immunisation are nearly universal and rates of malnutrition have declined from 40% to less than 5%.[10] In parallel, the women's groups have developed a greater sense of their potential for agency, and caste barriers among women have gradually diminished.

Kakamega Project (1974 to 1982)

The Kakamega project led by Miriam Were was established in western Kenya in 1974.11 Women in communities were supported to identify their own problems, collect their own data and select their own community health workers with open community involvement. Among other things communities set up village funds and bank accounts and established transport schemes enabling access to secondary care. The project achieved improvements in primary care, immunisation, water supplies, family planning, and malaria control. It also increased community support and self-reliance. As the women became empowered the visits from outside facilitators became less frequent.

40% reduction in under-5 mortality.[36] For newborn care, the SEARCH Project in India showed the value of a complex home-based newborn care package (which included community delivery of injectable antibiotics, health promotion, training of traditional birth attendants, and physician visits) within a programme where communities had been mobilised over an extended period.[37] Bang and colleagues[38] ascribe 36% of the reduction in neonatal mortality rate to sepsis management; assessing the contribution of community mobilisation within the intervention compared with control villages is more difficult, although important.

In Makwanpur district, Nepal, women's groups, led by a locally recruited woman facilitator, were supported through a community mobilisation action cycle where they discussed maternal and newborn health problems, developed strategies to address them, and then implemented and assessed the strategies in co-operation with local leaders, men, and health workers.[39] The mobilisation intervention had been developed in Bolivia under the Warmi programme [40,41] (figure 2). The Warmi programme had seen a large reduction in perinatal mortality rate using before and after analysis of a small population, and the larger Makwanpur cRCT showed a 30% reduction in neonatal mortality rate, as well as significantly fewer maternal deaths (although the numbers of maternal deaths were few and maternal mortality ratio had not been a primary outcome for the trial).[39]

Two more recently published studies are the Hala and Projahnmo community effectiveness trials in Pakistan and Bangladesh, which combine demand and supply-side interventions, with different results.[42,43] The Hala trial was a pilot non-randomised controlled trial in which Lady Health Workers (government health workers responsible for about 200 families each) received training in home-based neonatal care and local traditional midwives (dais) received voluntary training. In addition, village health committees were established for maternal and newborn health. Compared with baseline rates the trial showed a 35% decline in perinatal mortality rate and a 28% decline in the neonatal mortality rate in the intervention villages. The control villages showed no decline.[42] The Projahnmo cRCT assessed the effectiveness of specially trained community health workers, who provided a home-care package including assessment of newborn infants on the first, third, and seventh days after birth, and referral or treatment of sick neonates. The study showed a 34% reduction in neonatal mortality rate in the final 6 months of the trial compared with the comparison group.[43] However, unlike the studies outlined above, the third community care arm, in which community mobilisers held community meetings with women in villages, showed no effect on neonatal mortality compared with the control arm.[43]

What are the current controversies surrounding community mobilisation interventions?

Community mobilisation versus home care visits

Although increasing evidence favours the effectiveness of community mobilisation interventions, a comparison of the Makwanpur and Projahnmo trials is central to this policy dilemma. The Makwanpur trial suggests that community mobilisation through women's groups is a cost-effective approach to reduce neonatal mortality rate in remote villages where developing and maintaining a programme of home visits by outreach workers has been impossible.[44] Projahnmo, by contrast, suggests that community mobilisation is less effective than a home-care strategy in reducing neonatal mortality rate in communities with a weak health system and low health-care use. Several other trials testing different combinations of interventions, with mobilisation as a core

	Authors	Design	Type of interventions	Primary outcomes	Sample	Results	Comment
Warmi Project, Bolivia	O'Rourke[41] 1998	Before and after analysis	Women's groups using community action cycle. Intervention focused on initiating and strengthening women's organisations, developing women's skills in problem identification and prioritisation, and training community members in safe birthing techniques	Newborn mortality rate; perinatal mortality rate	Remote Bolivian mountain villages, around 15 000 population.	Evaluated by comparing perinatal mortality rate and obstetric behaviour among 409 women before and after the intervention. Perinatal mortality rate decreased from 117 deaths per 1000 births before the intervention to 43·8 deaths per 1000 births after. The proportion of women receiving prenatal care and initiating breast-feeding on the first day after birth was also significantly larger.Number of infants attended to immediately after delivery increased, but the change was not statistically significant	
SEARCH, Gadchiroli district, India	Bang[37,38] 1999 and 2005	Controlled trial (not randomised) Baseline phase (1993–1995), observational phase (1995–1996), and the 7 years of intervention (1996–2003)	Home-based newborn care consisting of sepsis management, supportive care of low birthweight newborn babies, asphyxia management, primary prevention, health education and training of traditional birth attendants. Built upon a pre-existing community mobilisation programme	Still birth rate; newborn mortality rate; perinatal mortality rate; newborn mortality rate; infant mortality rate	The baseline population was 39 312 in 39 intervention villages and 42 617 in 47 control villages. Livebirths in 10 years were 8811 in intervention villiages and 9990 in control villages	Newborn mortality rate in the control area showed an increase from 58 in 1993–1995 to 64 in 2001–2003. The rate fell by 70% (95% CI 59–81%) compared with the control area. Early newborn mortality rate decreased by 64% and late newborn mortality rate by 80%. Still birth rate decreased 49% and the perinatal mortality rate by 56%. Newborn mortality rate did not change, and the infant mortality rate decreased by 57%, (95% CI 46–68%). Cause-specific newborn mortality rate (1995–1996 *vs* 2001–2003) for sepsis decreased by 90%, for asphyxia by 53%, and for prematurity by 38%	Total reduction in newborn mortality rate during intervention (1996–2003) was ascribed to sepsis management (36%); supportive care of low birthweight newborn babies (34%); asphyxia management (19%); primary prevention (7%); and management of other illnesses or unexplained (4%). The contribution of community mobilisation in the intervention areas is difficult to estimate
Tigray, Ethiopia	Kidane[36] 2000	Cluster randomised controlled trial (cRCT)	Mother coordinators trained to teach other local mothers to recognise symptoms of malaria in their children and to promptly give chloroquine	Under-5 mortality rate	Total population of 70 506 in 37 tabias (cluster of villages) in two district were paired according to under-5 mortality rates. 24 tabias with the highest malaria morbidity were selected	190 of 6383 (29·8 per 1000) children younger than 5 years died in the intervention tabias compared with 366 of 7294 (50·2 per 1000 children) in the control tabias. Under-5 mortality was reduced by 40% in the intervention localities (95% CI 29·2–50·6; paired t test, p<0·003). Of 190 verbal autopsies, 13 (19%) of 70 in the intervention tabias were consistent with possible malaria compared with 68 (57%) of 120 in the control tabias.	
MIRA Makwanpur distict, Nepal	Manandhar[39] 2004	cRCT	Women's groups through community action cycle	Newborn mortality rate	24 clusters of mean 7000 people per cluster	Newborn mortality rate was 26·2 per 1000 (76 deaths per 2899 livebirths) in intervention clusters compared with 36·9 per 1000 (119 deaths per 3226 livebirths) in controls (adjusted odds ratio 0·70 [95% CI 0·53–0·94]). Stillbirth rates were similar in both groups.Maternal mortality ratio was 69 per 100 000 (two deaths per 2899 livebirths) in intervention clusters compared with 341 per 100 000 (11 deaths per 3226 livebirths) in control clusters (0·22 [0·05–0·90]).	
CHAMPION trial, Mahabubnagar district, Andhra Pradesh, India	Boone 2007	cRCT	Health promotion intervention includes a health education campaign, participatory discussion groups, training of village health workers and midwives, and improved coordination of antenatal services. The intervention group will also have subsidised access to pregnancy-related health care services at non-public health centres	Newborn mortality rate	464 villages	Ongoing	Final data analysis due in 2010

(Continues on the next page)

	Authors	Design	Type of interventions	Primary outcomes	Sample	Results	Comment
(Continued from previous page)							
Projahnmo Project, Shylet district, Bangladesh	Baqui[43] 2008	cRCT	Female community workers doing home care visits (1 per 4000) and community mobilisers running health education groups every 4 months vs control comparison areas	Newborn mortality rate	24 clusters of 20 000 per cluster in. 14769 livebirths in the home-care groups, 16325 in the community-care groups, and 15350 in the comparison groups	Newborn mortality rate was reduced in the home-care arm by 34% (adjusted relative risk 0·66; 95% CI 0·47–0·93) during the last 6 months of the trial vs that in the comparison arm. No mortality reduction was noted in the community-care arm (0.95; 0·69–1·31).	The community care arm involved fairly infrequent contact with community groups (once every 4 months) and provided health education rather than community mobilisation
Hala, Pakistan	Bhutta[42] 2008	Before and after analysis	Lady Health Workers and traditional birth attendants providing health education and maternal and child health services	Still birth rate; newborn mortality rate; health service use	315 villages with a total population of 138 600	Still birth rate reduced from 66 to 43 per 1000 and newborn mortality rate 57 to 41 per 10000 before and after in intervention sites. Skilled birth attendance from 18 to 30%	Preliminary results to be confirmed in an adequately powered trial
SNEHA Project, Mumbai, India	More 2008	cRCT	Women's groups through community action cycle	Newborn mortality rate; maternal and newborn morbidity; care practices and health care use	48 urban slum clusters of 1000–1500 households each. 24 clusters randomly allocated to receive the community intervention. 24 clusters will act as control groups, but will benefit from health service quality improvement	Ongoing	Final data analysis due in 2010
MaiMwana Project, Mchinji district, Malawi	Unpublished	cRCT	Womens groups through community action cycle and volunteer infant care and feeding counsellors	Newborn mortality rate; still birth rate; perinatal mortality rate; maternal mortality ratio	48 clusters (3000 people per cluster)	Ongoing	Final data analysis of 20 000 births due in November 2008
Perinatal Care Project DAB, Bangladesh	Unpublished	cRCT	Womens groups through community action cycle and management of birth asphyxia in the home using traditional birth attendants trained in bag and mask resuscitation	Newborn mortality rate; still birth rate; perinatal mortality rate; maternal mortality ratio	18 union clusters in 3 districts (25000 people per cluster)	Ongoing	Final data analysis of 32 000 births due in November 2008
Ekjut, Jharkhand and Orissa, India	Unpublished	cRCT	Women's groups through community action cycle	Newborn mortality rate; still birth rate; perinatal mortality rate; maternal mortality ratio	36 clusters across 3 districts. 7000 people per cluster	Ongoing	Final data analysis of 20 000 births due in December 2008
MIRA, Dhanusha district, Nepal	Unpublished	cRCT	Womens groups through community action cycle and newborn sepsis management in the home using female community health volunteers	Newborn mortality rate; still birth rate; perinatal mortality rate; maternal mortality ratio; nutrition indicators	60 clusters, 7000 people per cluster	Ongoing	Final data analysis due in 2009
Ifakara, Tanzania	Unpublished	cRCT	Community-based package focussed around interpersonal communication through home visits in pregnancy and the early neonatal period by a village-based "agent of change" linked to existing village health volunteers.	Newborn mortality rate	24 divisions in 5 districts	Ongoing	Data analysis due in 2011

Table: **Published and currently ongoing trials of interventions involving community mobilisation for maternal and child health**

component, are currently in progress (table). The interpretation of the findings of these trials must be considered carefully to guide policy makers. For example, the community mobilisation component of Projahnmo was less intensive than in Makwanpur. Thus, an important question to ask of these trials might be, what is the necessary level of intensity and coverage of community mobilisation and home-care interventions, to produce the most cost-effective effect? Other important questions include which are the most effective models of these interventions, can they be scaled up in the poorest communities, and what are the institutional and financial barriers to scale-up?

Community health workers

The use of so-called barefoot doctors in China inspired primary health care. This model involved local community residents—community health workers—liberating communities by providing first line health care and facilitating others to embrace changes brought about by the new government.[45] This model was adopted by many governments and non-governmental organisations after the Alma-Ata Declaration and in many cases became the definition of primary health care. However, by the 1990s many government programmes for community health workers had vanished because of problems in integrating them into national programmes.[46] People also questioned whether community health workers actually empowered or oppressed as a result of the existing, socioeconomic political structures, bureaucracies, and lack of support from health professionals.[47]

Recently, community health workers have generated renewed interest, in part because they are seen as a cheap way of scaling up primary health care, and also because HIV/AIDS programmes demand more care at community level. The pandemic has claimed the lives of many health workers especially in Africa. The current interest lies mainly in community health workers as care providers but this can be problematic as large-scale government training programmes often lack standards, supervision, and resources. Furthermore, the evidence suggests that community health workers are most effective when they also facilitate change at the community level[48,49] and participatory approaches promoted by the online journal Participatory Learning and Action have provided structures and frameworks that support this role.[5] Overall, community health workers are most successful when they have the respect and support of governments, public service workers, and the communities they serve.

Does community mobilisation empower people to address socioenvironmental causes of ill-health?

Health, particularly in marginalised groups, is indirectly but powerfully affected by the social environment in which personal behaviours are embedded. Risk factors (such as isolation, lack of social support, low self-esteem) and risk conditions (such as poverty, discrimination, steep power hierarchies) can impair control or capacity and the respectful relationships that enable good maternal and child health.[50,51] Community mobilisation initiatives reported to improve the socioenvironmental causes of ill health have addressed a range of concerns including alcohol related violence, breast cancer treatment, and safety in public environments.[59,60,61] The impetus to address these causes of ill-health began when there was sufficient support to form a community of interest. This community started a process of capacity building—community empowerment—toward gaining more control over the decisions for resource allocation such as the award of a grant or to decision making such as the development of policy or legislation (panel 2). The key to the success of community empowerment was the moment when the community engaged with the problem-posing, problem-solving process and recognised that they could collectively change their circumstances. However, effect can vary greatly depending on decisions about the goal, who constitutes the community, who is facilitating and supporting the process, the social and political context, the duration of external or donor support, and the cost-effectiveness of the programme.[62] Different forms of community mobilisation might simply mobilise communities to initiate localised actions based on their immediate needs rather than broader social and political actions.

What is not known is to what extent peoples' involvement can actually increase resources to support health care, whether participation can create a genuine social learning partnership between people and professionals, whether

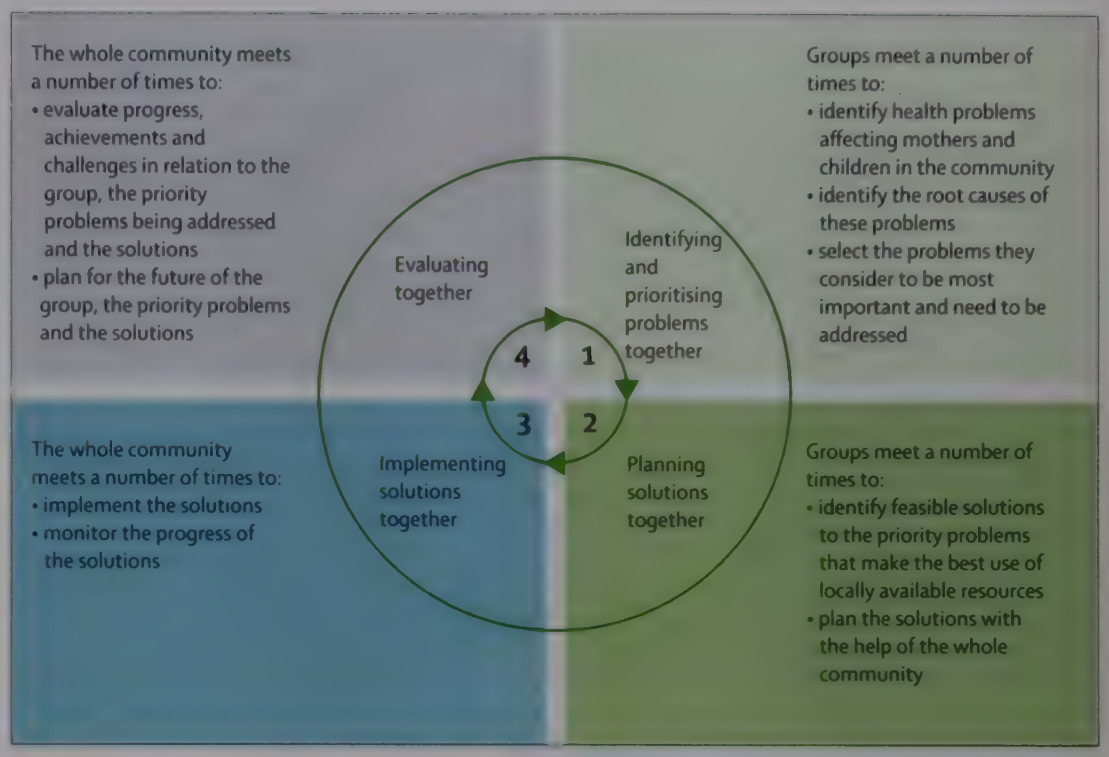
The whole community meets a number of times to:
• evaluate progress, achievements and challenges in relation to the group, the priority problems being addressed and the solutions
• plan for the future of the group, the priority problems and the solutions
Groups meet a number of times to:
• identify health problems affecting mothers and children in the community
• identify the root causes of these problems
• select the problems they consider to be most important and need to be addressed
Evaluating together
Identifying and prioritising problems together
4
1
3
2
Implementing solutions together
Planning solutions together
The whole community meets a number of times to:
• implement the solutions
• monitor the progress of the solutions
Groups meet a number of times to:
• identify feasible solutions to the priority problems that make the best use of locally available resources
• plan the solutions with the help of the whole community

Figure 2: **Women's groups community mobilisation action cycle**
The Warmi project in Bolivia developed a model for community mobilisation using this community action cycle.[40] Women's groups discuss and prioritise their problems, develop strategies to solve them, and, after engaging with other community members, implement and evaluate these solutions. The completed Makwanpur (Nepal) trial and ongoing trials in Mumbai (India), Jharkhand and Orissa (India), Mchinji (Malawi), Dhanusha (Nepal), and Bangladesh are assessing the effect of different women's group models, developed from this model, on mother and child health (table).

***Panel 2:* Building community empowerment**

Community empowerment is a synergistic interplay between individual empowerment,[52] organisational empowerment,[53] and broader social and political actions.[54] Empowered community-based organisations are at the heart of community empowerment, since they link empowered individuals and effective political action.[55] This interplay can be conceptualised as a continuum of five progressively more organised and broadly based forms of social and collective action (main bullets).[56,57] These five forms can be further subdivided into domains (sub-bullets), which represent the means through which individuals and groups can organise themselves to harness the interpersonal elements of empowerment and address the broader determinants of their health.[58]

- Personal action
  - Community participation
- Small mutual groups
  - Problem assessment
  - Local leadership
- Community organisations
  - Local leadership
  - Organisational structures
  - Resource mobilisation
- Partnerships
  - Organisational structures
  - Resource mobilisation
  - Links to others
  - Asking why
- Social and political action
  - Links to others
  - Asking why
  - Role of outside agents
  - Programme management

community mobilisation can really change a commitment to social justice and democracy, and whether community mobilisation can actually accelerate progress at scale toward achievement of MDGs 4 and 5 in high-mortality, resource-poor settings.

What are the mechanisms through which community mobilisation brings about improved health outcomes?

Some observers feel that community mobilisation works simply by bringing about changes in behavioural risk factors such as home care practices and decisions about care seeking. Although undoubtedly one important mechanism through which community mobilisation works, studies of health education suggest that simply providing key messages to improve maternal and newborn care cannot possibly account for all the effect these approaches have on morbidity and mortality.[63,64] A large proportion of this effect is thought to be due to community mobilisation bringing about changes in socioenvironmental risk factors by developing the capacities of communities, the choices they make, and their ultimate empowerment. This mechanism is enshrined in the Ottawa Charter (1986) and the Jakarta Declaration (1997), which equated health promotion with goals of empowerment and a more long term and fundamental shift in village, family, and gender power relations.[65]

Women's groups in Malawi and Nepal are increasing the important capacities within communities, such as the ability to identify maternal and neonatal health problems and their root causes; the ability to mobilise resources necessary for improving the health of mothers and newborn infants; the internal and external social networks they can draw on when needed; and the development of strong local leaders who have the motivation and drive to improve maternal and neonatal health in the community.[66,67] The women's groups are also drawing on these social capacities to make fundamental choices to improve their health, such as about the equitable sharing of resources needed for better maternal and neonatal health; about planning feasible strategies to address maternal and neonatal health problems; about planning, implementation, evaluation, finances and reporting of programmes; and about which people and organisations to approach to address problems. Detailed longitudinal exploration of these processes is crucial to provide answers to policy makers about how community mobilisation works, to inform programme design, and to build the case for government investment.

Is community mobilisation less important than facility-based medical interventions?

Many safer motherhood analysts, such as policy makers and academics, would consider community mobilisation a peripheral component of a package to reduce maternal mortality, which is far more dependent on specific facility based interventions than is child survival.[22] However, the evidence supports a more central role for community mobilisation. Firstly, numerous interventions such as family planning, nutritional support for women, and the treatment of haemorrhage, sepsis, and unsafe abortion are all potentially amenable to interventions in the community.[68] Secondly, the so-called first delay (recognising a maternal problem in the home and deciding to seek care) is a key problem for safer motherhood programmes and solving it requires the participation of communities (panel 3). Thirdly, poverty and disadvantage are the underlying causes of many neonatal and maternal deaths; 99% of maternal and neonatal deaths occur in low-income and middle-income families and in poor countries, and maternal mortality is often more than twice as high in the poorest compared with the richest economic quintile household.[69,70] The link between social disadvantage and mortality is subtle and indirect but maternal and newborn survival and good health are ultimately the result of a society that values women and children irrespective of their race, social, economic, and political status and provides unimpeded

access to information and health services from the household to the hospital. Community mobilisation, in addressing inequality rather than only improving health services, is thus a priority strategy for improving survival of mothers and newborn infants.[69,70]

Although maternal survival requires improvements in comprehensive and basic obstetric care at hospitals and health centres, community mobilisation has an important role in improving care practices, increasing the use of safer motherhood services, promoting timely referral when problems arise, and reducing social disadvantage. Some of the ongoing trials cited in the table could have the statistical power to add to this debate by exploring the extent to which community approaches reduce maternal mortality directly compared with indirectly by promoting deliveries in hospitals.

Panel 3: Case study of how women's groups are addressing first-delay in maternal and child care: Jharkhand, India

Sini Koda comes from Tipusai, a remote hamlet of Baraibir village in West Singhbhum district of Jharkhand state. It is 25 kms from a private facility where emergency obstetric care is available and receives infrequent visits from Auxiliary Nurse Midwives. She, her husband, mother-in-law, and other members of the family regularly attend women's group meetings, facilitated by Rani Kayam who was trained and is employed by Ekjut Project, a local non-governmental organisation. The group meets monthly and engages in participatory learning and action activities focusing on maternal and child health. During one of these meetings they engaged in a "woman in labour – emergency drill" role-play session. In this session they learnt how to mobilise quickly at the time of labour and avoid delays. When it came time to deliver, Sini's in-laws tried to perform traditional rituals that would delay her from getting to the health facility. However, her husband and other women's group members used what they had learnt to collect 5000 rupees from other community members for transport and hospital costs. As a result, Sini was able to get to the facility with the minimum of delay where she delivered normally and successfully.

How can community mobilisation be taken to scale?

Scale-up of health interventions might involve increasing coverage by geographical expansion, adding technical interventions to an existing programme, advocacy to change policies, and strengthening capacity with more resources, new alliances, and technical skills.[71] But how can governments, even in partnership with civil society organisations, achieve scale-up of community mobilisation interventions in these ways? Several approaches have been used including: government directed and implemented programmes;[72] partnerships between government and non-governmental organisations;[73,74,75] so-called living universities and centres of learning;[72,76] dissemination of methods and results through manuals, training packages, internet, radio, video, TV, and university classes; and organic spread from community to community through word-of-mouth or direct observation. These approaches have succeeded in massive scale-up of community mobilisation interventions in countries such as Bangladesh, China, Cuba, Sri Lanka, and Tanzania. Thus, these interventions, due to their dependence only on facilitation and community resources, seem to be no more difficult to scale-up than others such as immunisation programmes, which depend on cold chains, drugs, technology, and a large network of paid health workers. However, in the poorest countries the capacity and commitment for scale-up remains weak and extensive coverage alone is insufficient to ensure that the most vulnerable populations benefit in the long-term.

Case studies, trials, and large-scale programmes have shown that, when given the opportunity, communities can develop effective strategies to address their needs and reduce mortality and morbidity. These strategies are often highly innovative, practical, and culturally acceptable. What is scaled-up is not solutions but a process to support communities to develop their own solutions. As a result, programmes must be flexible enough to respond to variations between, and within, communities and must allow adequate time for this process of capacity building. Also, a favourable environment for scaling up can be created if national policies are in place which support community mobilisation. Programmes are more successful if they communicate from the same belief system. This success can be achieved by seeking to understand and take into account the social norms and local cultural context around health, community participation, gender roles, use of health services, and household decision making. Importantly, programmes should not cut out or limit essential steps such as problem identification, prioritisation, and strategy formulation by communities.

Irrespective of whether the facilitating agent is a representative of a non-governmental organisation, member of a community based organisation, government fieldworker, or volunteer they must have: credibility in the communities; language skills and cultural sensitivity; knowledge of community structures and protocols; interest in being a facilitator and in maternal and newborn health; affiliation with and support from an organisation; good interpersonal communication skills; and availability of time to do the work.

The main programme cost is building human and community capacity, which needs adequate investment. This process means prioritising investment in ongoing training, facilitation, and capacity strengthening and the use of cost-effective methods such as cascade-training structures. Costs within the programme can in part be covered by contributions from the community but this must be done carefully while respecting roles and responsibilities and keeping in mind programme principles of community ownership and sustainability.

Partnerships of government, non-governmental organisations, private sector, and community-based organisations are essential, but can face differences in organisational cultures and values, competition for resources, and varying levels of capacity. Successful programmes define roles and responsibilities clearly, allocate resources fairly, and establish operational

guidelines, communication systems, parameters for implementation, and mechanisms for dealing with problems or disputes. Finally, new technologies such as community radio, mobile phones, internet, and digital and video cameras have rapidly become more accessible and could present new opportunities for communication, gathering information, organising, coordinating, and increasing participation.

Conclusion

There is evidence that community mobilisation is an effective method for promoting participation and empowering communities among a wide range of other non-health benefits. The experience of pilot programmes before the Alma-Ata Declaration, and subsequent trial evidence, also suggests that community mobilisation can bring about cost-effective and substantial reductions in mortality and improvements in the health of newborn infants, children, and mothers. Nonetheless community mobilisation is not a feature of most large-scale primary health care programmes, because it is characterised by several fundamental controversies. What form should it take to be most effective? Does it effectively address the socioenvironmental risk factors that underpin health problems and mortality? How does it work? What part does it have to play in interventions for maternal survival? How can it be scaled-up effectively? Continuing studies and future research, particularly focusing on process, are needed to address these controversies and fully unlock the potential that community mobilisation approaches have to improve health and reduce mortality.

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Alma-Ata: Rebirth and Revision 6
Interventions to address maternal, newborn, and child survival: what difference can integrated primary health care strategies make?

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See Editorial page 863

This is the sixth in a Series of eight papers about Alma-Ata: rebirth and revision

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Several recent reviews of maternal, newborn, and child health (MNCH) and mortality have emphasised that a large range of interventions are available with the potential to reduce deaths and disability. The emphasis within MNCH varies, with skilled care at facility levels recommended for saving maternal lives and scale-up of community and household care for improving newborn and child survival. Systematic review of new evidence on potentially useful interventions and delivery strategies identifies 37 key promotional, preventive, and treatment interventions and strategies for delivery in primary health care. Some are especially suitable for delivery through community support groups and health workers, whereas others can only be delivered by linking community-based strategies with functional first-level referral facilities. Case studies of MNCH indicators in Pakistan and Uganda show how primary health-care interventions can be used effectively. Inclusion of evidence-based interventions in MNCH programmes in primary health care at pragmatic coverage in these two countries could prevent 20–30% of all maternal deaths (up to 32% with capability for caesarean section at first-level facilities), 20–21% of newborn deaths, and 29–40% of all postneonatal deaths in children aged less than 5 years. Strengthening MNCH at the primary health-care level should be a priority for countries to reach their Millennium Development Goal targets for reducing maternal and child mortality.

Introduction

Recent years have seen a major emphasis on the persisting burden of maternal, newborn, and child mortality globally with a particular focus on the Millennium Development Goals (MDGs) for maternal and child health. Issues pertaining to the burden of this mortality and interventions to reduce it have been the subject of several recent *Lancet* series and other publications. These include reviews on child,[1,2] newborn,[3] and maternal survival,[4,5] child development,[6] and maternal and childhood undernutrition.[7] All of these analyses have provided estimates of disease burden and described a wide array of effective interventions that could make a difference (webtable 1).[8]

See Online for webtable 1

Despite calls for action to improve maternal, newborn, and child health (MNCH) and survival in health systems,[9] how many interventions can be operationally scaled up in country-level programmes is unclear. With so many options, consensus on a reasonable number of interventions that work in primary health care is needed, as are strategies to distribute them. In a recent exercise to support provision of maternal, newborn, and child interventions across the continuum of care, a case has been made for providing some 190 interventions through eight packages that could be delivered at various levels of the health system.[8] Of these, five packages of interventions were identified (webfigure) that could be delivered through family and community care and through outpatient or outreach services at first-level facilities. Our definition of primary health-care settings retains the same framework inclusive of interventions delivered at first-level health facilities.[10]

See Online for webfigure

A recent investigation of intervention coverage from 68 countries with 97% of the global burden of maternal and child deaths revealed that the implementation, uptake, and extent to which distribution of interventions is equitable varies greatly.[11] Interventions that can be routinely scheduled and delivered, such as immunisation and antenatal care, had much higher coverage than those that rely on 24 h availability of clinical services, such as skilled or emergency care at birth and care of sick newborn babies and children. For some interventions, such as postnatal care after birth (which lies somewhere between the two extremes above), either the coverage was poor or data were unavailable. A recent Cochrane review revealed that few studies have assessed integrated MNCH interventions at the primary health-care level, none including efforts at community level for demand generation.[12] Although many countries implement MNCH interventions with some degree of integration, the range of proven interventions implemented is limited, and there have been no systematic assessments relevant to MNCH and survival.

These findings are a major cause for concern and reflection. Three decades after the Alma-Ata Declaration, the state of primary care for mothers, newborns, and children remains poor, and as a result only 16 countries are on track to reach the fourth MDG of reducing child mortality, and data from which to estimate maternal mortality trends reliably simply do not exist.[11] Some of the factors associated with this include lack of coordination between various programmes (both vertical and horizontal) and existing health workers and crucial shortages of trained health staff in primary care settings

in populations at risk. These problems are exacerbated by a lack of common measures, messages, and targets across the continuum of care for MNCH and by sometimes strongly conflicting views with respect to the best balance between community, outreach, and facility-based delivery strategies.[8]

The emphasis on facility-based care and emergency obstetric care from those concerned with maternal survival is understandable, whereas advocates for newborn and child survival have placed more emphasis on community-based strategies. Despite the proliferation of recent reviews, no clear, consistent, and agreed strategy for integrated MNCH care at primary care level has emerged. The evidence base for the types of interventions that a range of primary health-care workers, such as medical and paramedical staff, community health workers and other providers can deliver, along with complementary community and health system support strategies, is limited and often focused on selected interventions. In general, previous studies[13] and reviews[14] of community-based interventions have largely addressed care at the household level without clear linkages to health facilities. Although attempts have been made to package interventions for newborn and child survival,[15] comparable efforts to understand the evidence base for suitable and scalable maternal health interventions in primary health-care settings have lagged behind.

We did a systematic review of various MNCH interventions with the aim of identifying a mix of evidence-based interventions and best delivery strategies for primary health care in developing countries. Our specific aim was to complement previous reviews with newer evidence on potentially useful interventions and delivery strategies and to quantify their effects. We then did two specific case studies from representative countries in Africa (Uganda) and south Asia (Pakistan) to assess how these might be delivered cost effectively within existing health systems, and what difference these integrated primary care strategies might make to MNCH, especially mortality in these circumstances.

Methods

Search strategy and selection criteria

We searched Medline, the Cochrane Database of Systematic Reviews, the WHO/RHR Reproductive Health Library, Medcaribe, Wholis, PAHO, Lilacs (*Literatura Latino-Americana e do Caribe em Ciências da Saúde*), and Scielo (Scientific Electronic Library Online). Additional studies were obtained through hand search of references from identified studies. We assessed relevant publications from UN agencies, bilateral agencies, non-governmental organisations, research bodies, and academic institutions. Unpublished data and reports were requested, when deemed necessary, from authors who reported having measured one of our outcomes of interest.

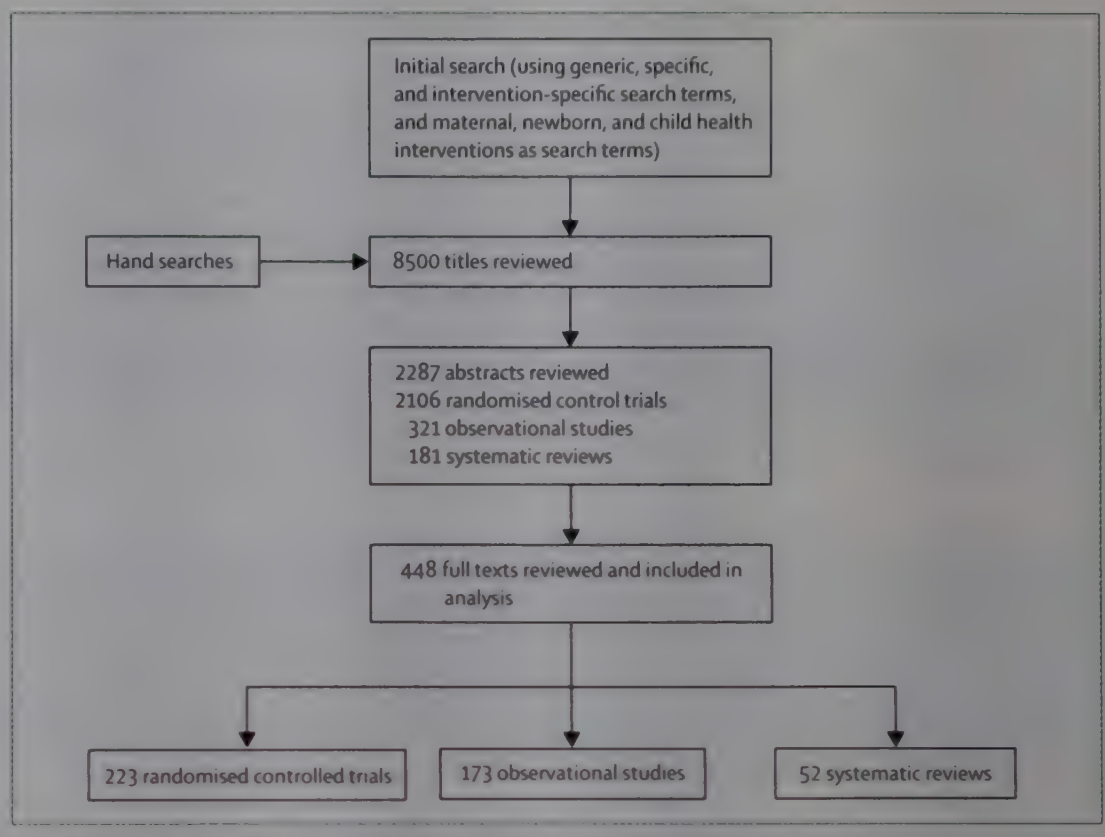

Initial search (using generic, specific, and intervention-specific search terms, and maternal, newborn, and child health interventions as search terms)
Hand searches
8500 titles reviewed
2287 abstracts reviewed
2106 randomised control trials
321 observational studies
181 systematic reviews
448 full texts reviewed and included in analysis
223 randomised controlled trials
173 observational studies
52 systematic reviews

Figure 1: **Study selection for systematic review**

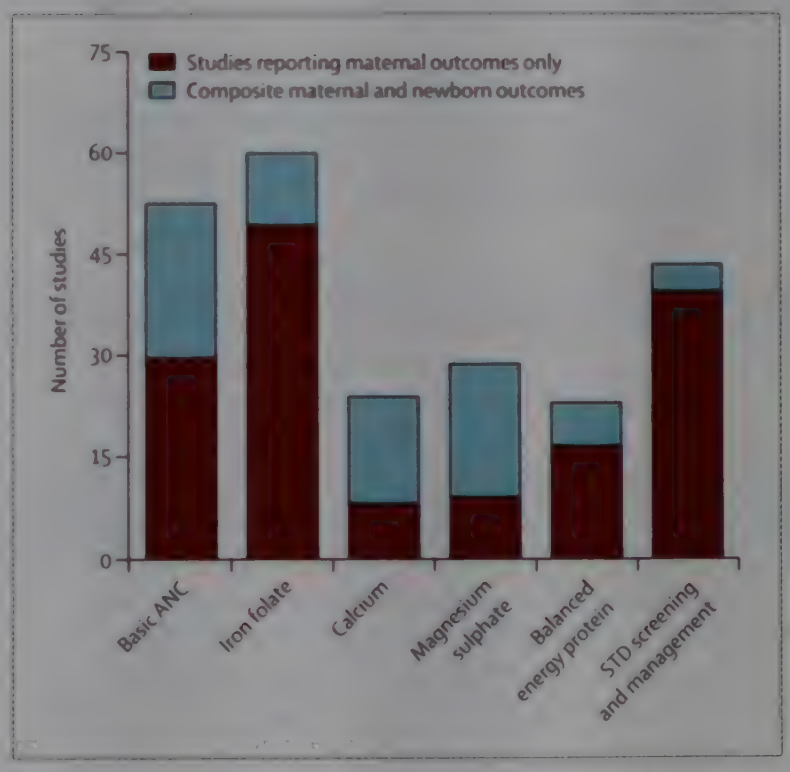


Figure 2: **Reported composite maternal and newborn outcomes in maternal interventions**

ANC=antenatal care. STD=sexually transmitted diseases.

The full listing of search terms and strategies is available from the authors. Various search strategies with specific terms and leads were used. Our starting points were the MNCH interventions recommended by the recent evidence reviews in *The Lancet*[1–7,9] and the list of WHO recommended interventions for improving maternal and newborn health (WHO & UNFPA, Making Pregnancy Safer 2007, personal communication). Search terms specific to these identified interventions and age bands, such as "family planning" or "birth spacing" and "maternal health" or "newborn health" were used to

See Online for webtable 2

identify relevant studies and reviews. We narrowed our search to all identified interventions (webtable 2) by using key words "tetanus immunisation and pregnancy", "folate supplementation and pregnancy", "periconceptional folate", "breastfeeding", "vitamin A" or "retinol", "kangaroo care or skin to skin care", "HIV and pregnancy", etc. Intervention and search terms specific to health-system delivery strategy were also used to

	Recommended for inclusion in various settings	Relevant effect estimate
Low-dose aspirin in pregnancy[40]	Expanded antenatal package (for at risk women)	17% reduction in risk of proteinuric pre-eclampsia (RR=0·83, 95% CI 0·77–0·89); reduced fetal and neonatal deaths (0·86, 0·76–0·98); reduction in SGA, any definition (0·90, 0·83–0·98); and reduced risk of birth <37 weeks (0·92, 0·88–0·97)
Calcium supplementation during pregnancy[41,42]	Expanded antenatal package (universal in populations with low calcium intake)	Reduced risk of high blood pressure (0·70, 0·57–0·86) as well as pre-eclampsia (0·48, 0·33–0·69);[41] routine calcium supplementation in pregnancy with low baseline dietary calcium intake is associated with reduced maternal death or serious morbidity (0·80, 0·65–0·97)[42]
Referral for skilled care including oxytocic use and active management of third stage of labour for prevention of PPH; caesarean as indicated	Universal in first-level facilities	Prophylactic oxytocin showed benefits or reduced blood loss (RR for blood loss greater than 500 mL 0·50, 0·43–0·59) compared with no uterotonics;[43] active vs expectant management of labour reduces the risk of severe PPH (RR 0·33, 0·21–0·51);[44] benefit of emergency referral and caesarean for obstructed labour and maternal complications well established[4,5] with evidence that provision and strengthening of emergency obstetric care services can increase use;[45,46] oral or sublingual misoprostol (0·66, 0·45–0·98) compared with placebo was effective in reducing severe PPH and blood transfusion (0·31, 0·10–0·94); however, compared with conventional injectable uterotonics, oral misoprostol was associated with higher risk of severe PPH (1·32, 1·16–1·51)
Antibiotics for preterm, premature rupture of membranes	Universal in first-level facilities	Significant reduction in chorioamnionitis (0·57, 0·37–0·86); reduction in the numbers of preterm births within the next 7 days (0·80, 0·71–0·90) and markers of neonatal morbidity, such as infection (0·68, 0·53–0·87)[47]
Continuity of care between trained traditional birth attendants, midwives and doctors	Universal	Reduced likelihood of hospitalisation antenatally for complications (0·79, 0·64–0·97) and reduced risk of apgar score <7 at 1 min (0·53, 0·44–0·64)[48]
Magnesium sulphate for pre-eclampsia	Universal in first-level referral facilities	41% reduction in the risk of maternal death after eclampsia with use of magnesium sulfate compared with diazepam, (0·59, 0·37–0·94) and fewer infants with apgar scores <7 at 5 min (0·72, 0·55–0·94)[49]
Training traditional birth attendants for basic newborn care and referrals to health system	Situational	Reduction in number of stillbirths (adjusted OR 0·69, 0·57–0·83), perinatal death rate (0·70, 0·59–0·83) and neonatal mortality (0·71, 0·61–0·82). Maternal referral rates were significantly higher (1·50, 1·18–1·90, p<0·001) with reduced rates of post-partum haemorrhage (cluster adjusted OR 0·61, 0·47–0·79)[50]
Maternal mental-health interventions	Universal	Evidence of maternal empowerment and use of reproductive health services; improved maternal mental-health outcomes including reduced rates of post-partum depression and child development in infancy[51,52]
Antenatal steroids for those at risk of preterm births	Universal in first-level facilities	Overall reduction in neonatal mortality (RR 0·69, 0·58–0·81) and reduced systemic infections in the first 48 h of life (0·56, 0·38–0·85 and reduced risk of respiratory distress syndrome (0·66, 0·59–0·73)[53]
Kangaroo mother care (KMC)	Situational	In South Africa, 78 hospitals participating in the KMC programme and with monitoring reported reduction in neonatal mortality versus historical controls or those with no KMC (0·81, 0·72–0·91);[54] KMC was associated with reduced risks of nosocomial infection at 41 weeks corrected gestational age (0·49, 0·25–0·93), severe illness (0·30, 0·14–0·67), lower respiratory tract disease at 6 months follow-up (0·37, 0·15–0·89), not exclusively breastfeeding at discharge (0·41, 0·25–0·68)[55]
Community treatment of infections (including antibiotics for pneumonia and sepsis)	Situational	Treatment of neonatal pneumonia by community health workers was associated with reduction in all cause mortality of 27% (18–35%) and pneumonia-specific mortality by 42% (22–57%);[56] 50% reduction in neonatal deaths reported with domiciliary use of antibiotics in one community trial and 76% reduction in infection-related mortality[31]
Possible basic neonatal resuscitation strategies for health facilities and in community settings	Situational	A large scale facility-based intervention[57] with resuscitation training indicated that the incidence of mild birth asphyxia decreased by 60%, from 14% in the observation year (1995 to 1996) to 6% in the intervention years (p<0·0001); case fatality in neonates with severe asphyxia decreased by 47·5%, from 39% to 20% (p<0·07) and asphyxia-specific mortality rate by 65%, from 11% to 4% (p<0·02); similar benefits were seen in Macedonia with neonatal resuscitation training in health system settings;[58] a systematic review showed slightly better survival rates at follow-up with the use of air versus 100% oxygen for resuscitation (RR 0·71, 0·54–0·94);[59] domiciliary neonatal resuscitation by community health workers reduced the asphyxia-specific mortality rate by 67%[60]
Insecticide-treated bednets	Situational	Reduction in all-cause child mortality (0·82, 0·76–0·89)[61–63]
IPTi and IPT	Situational	During the first year of life, intermittent sulfadoxine pyrimethamine treatment reduced the incidence of clinical malaria by 22·2% (3·7–37·0%) and the hospitalisation by 19% (4·0–31·0%);[64] IPTi reduced the incidences of malaria and severe anaemia by 22·5% (12·0–32·0%) and 23·6% (4·0–39·0%), respectively[65]
Prevention and treatment of severe acute malnutrition in affected children	Situational	Facility-based management indicates reduction in mortality by at least 55% (0·32–0·62, random effects);[6,66] observational data suggest that survival rates are probably higher in community settings and that community-based management strategies are more acceptable to families[67]
Continued care and rehabilitation of undernourished children	Situational	Follow-up of children after treatment for severe acute malnutrition; some evidence from intervention studies of benefit of combined stimulation and nutrition rehabilitation[68]
Early child development interventions	Universal	Although large-scale community-based trials are lacking, there is strong evidence that early childhood development interventions have significant benefit[6,69]
Road traffic injury or accident prevention strategies	Universal	Maybe potentially important but the evidence of the efficacy of preventive strategies (including legislation and community education) is weak with very few data from developing countries; some studies with historical controls suggest 17–26% reduction in injuries[70–72]

RR=relative risk. SGA=small for gestational age. PPH=post-partum haemorrhage. IPT=intermittent preventive treatment for malaria. IPTi=IPT in infants.

Table 1: **MNCH interventions suitable for delivery in primary care settings**

	Target populations and interventions	Impact estimates
Mass-media strategies (including print and electronic media)	Communities and populations; promotion of key MNCH behaviours and uptake of interventions	19 of 20 studies in this systematic review concluded that mass media was effective; the direction of effect was also consistent across studies towards the expected change[75]
Social marketing strategies and health promotion, including health days and special campaigns	Social marketing to complement mass-media strategies for several interventions including health-service schemes and use of contraceptives, especially in reproductive health	The effectiveness of social marketing strategies has varied between various programmes; in particular, impact has been demonstrated on behaviours, such as smoking and alcohol consumption rates, but more objective data is needed;[76] meta-analysis of 93 studies found that in disease prevention messages, gain-framed appeals that emphasise the advantages of compliance with the communicator's recommendation are more persuasive than loss-framed appeals that emphasise the disadvantages of non-compliance[77]
Strategies to reduce user fees	Investigation of the effects of user fees on care use and the effect of fee reduction	Although some studies suggest that introduction of user fees was not associated with reduced service use,[78] reduction or elimination of user fees coupled with strategies for ensuring quality increases use of services[79,80]
Conditional cash transfers (CCTs)	A range of CCT projects, including the PFA in Colombia, PROGRESA in Mexico, and RPF in Nicaragua	Reduced stunting rates in PROGRESA; an increase of 16% in mean growth rate per year corresponding to 1 cm increase in height per year; reduced prevalence of stunting by 10% in 12–36 months age group and overall decline in stunting from 41·9% to 37·1% over 2 years[7]
Microcredit or voucher schemes[81]	Microcredit programmes and voucher schemes to improve maternal health	In a cross-sectional study from Kerala, India, early joiners of an SHG (a microcredit programme in India, known as self-help groups) were less likely to report emotional stress (OR 0·52, 95% CI 0·30–0·93) and poor life satisfaction compared with non-members (0·32, 0·14–0·71)[82]
Community mobilisation through support groups[29,30,83]	Community support groups with the aim of providing health messages and support for care seeking and linkages with the health system	The overall effect of community support groups on MNCH-related behaviours and newborn mortality seems positive; comparable trends are also evident on reduction in perinatal mortality (webappendix)

Table 2: **Additional delivery and demand-creation strategies**

expand the search and identify studies done in relevant health system settings (eg, "community and child care", "primary care and maternal care", "home-based treatment and newborn care", etc). Although our principal focus was information from randomised controlled trials, we extended the assessment to include reports with a range of alternative quasiexperimental designs and population-based observational studies.

We also searched for information on interventions where integration at various levels of care and between various cadres of workers was attempted. In addition to repeating the search strategy used by Briggs and Garner,[12] we used specific search terms with integration of maternal, newborn, and child health services (eg, "Integration and intervention in mother or intervention in children", etc). We did not specifically assess general strategies for improving uptake of non-specific interventions or care seeking in primary care settings. These are detailed elsewhere in this issue.[16] A general search was done for information related to large primary care programmes in which the specific focus was on MNCH and a range of relevant interventions were used.

There were no restrictions as to type of intervention or study design, geographical setting, type of population, date, or language of publication, but the studies were restricted to those in people.

Data abstraction, analysis of study quality, and effect estimation

The data were independently extracted in predesigned abstraction forms by three independent reviewers (SA, TA, and Quratulain Humayun) and further assessed by ZB and SC, and discrepancies resolved by consensus. The reviewers independently assessed eligibility using predefined inclusion and exclusion criteria, but were not blinded to periodical names, authors and institutions.

Of an estimated 8500 search hits, titles on the electronic database, and papers from hand searches, 2287 abstracts were identified for review. We finally included 223 randomised controlled trials, 52 systematic reviews, and 173 observational studies in the analysis (figure 1).

The review team assessed trials for methodological quality, adequacy of allocation concealment, blinding of participants, providers of care, and assessors of outcome and loss to follow-up, attrition and exclusions. Studies were assessed for size, setting, quality, and design.

We used existing pooled analysis estimates where available and did further systematic summary estimations as required where additional recent data were available to obtain summary measures for relevant, maternal, neonatal, and child outcomes with RevMan software (version 4.2.10; RevMan 2007) using standard Cochrane recommended protocols for heterogeneity testing. The study quality and findings were assessed using the GRADE criteria[17] and ranked on a scale of 1–3 (1=strong evidence of benefit in efficacy and effectiveness settings and recommended, 2=moderate level of evidence of effect but recommended for inclusion in health systems, and 3=low level of evidence but recommended for further assessment in health systems on additional criteria and plausibility).

Interventions short-list

We focused on interventions that could be delivered by primary health care (ie, in community settings and at first-level facilities in district health systems). Primary care settings and interventions were defined as those that included family and community interventions (largely at household or domiciliary level); interventions through outreach services including community health workers operating from village health posts or first-level facilities;

	Design	Interventions	Comparison Group	Results
Bang (1999), Maharashtra, India[31]	Controlled trial (not randomised); baseline phase (1993–95), observational phase (1995–96), and the 7 years of intervention (1996–2003)	Village health workers trained in maternal and newborn health asked to visit pregnant women in the third trimester, at the time of birth, and eight times after birth; they managed birth asphyxia, premature birth or low birthweight, hypothermia, and breastfeeding problems; they diagnosed and treated neonatal sepsis with oral cotrimoxazole and injectable gentamicin; assistance by TBAs, health education, and fortnightly supervisory visits were also provided	Usual care available in the local health system	Significant (62%) reduction in neonatal, and perinatal mortality rates (71%) in the intervention area compared with the control area; case fatality in neonatal sepsis declined from 16·6% (163 cases) before treatment, to 2·8% (71 cases) after treatment by village health workers (p<0·01)
Manandhar (2004) Makwanpur, Nepal [29]	Cluster randomised controlled trial	Trained female facilitators supported women groups through an action-learning cycle in which they identified local perinatal problems and formulated strategies to address them	Health service strengthening activities done in both areas (primary health care equipment with neonatal resuscitation facilities), training of health staff, community health workers, and TBAs in essential newborn care and provision of kits to community health workers	From 2001 to 2003, the neonatal mortality rate was 26·2 per 1000 (76 deaths per 2899 livebirths) in intervention clusters compared with 36·9 per 1000 (119 deaths per 3226 livebirths) in controls (adjusted OR 0·70, 95% CI 0·53–0·94); women in intervention clusters were more likely to have antenatal care, institutional delivery, trained birth attendance, and hygienic care than were controls
Jokhio (2005), Sind, Pakistan[28]	Cluster randomised controlled trial	TBAs were trained and issued disposable delivery kits. TBAs were asked to visit pregnant women at least three times during the pregnancy (months 3, 6, and 9) to check for danger signs and to encourage women to seek emergency obstetrical care; LHWs linked TBAs with established services and documented processes and outcomes; outreach clinics for antenatal care were provided by obstetrical teams	TBAs did not receive any training and were not given delivery kits; LHWs enrolled and followed up all pregnant women in their catchment area in the course of their normal monthly home visits; no outreach clinic was organised and women received usual care	Significant reduction in perinatal deaths in intervention clusters (RR 0·70, 0·59–0·82) and in maternal deaths (0·74, 0·45–1·23)
Bhutta (2008), Hala, Pakistan[30]	Cluster controlled trial	LHWs received additional training on essential maternal and home-based newborn care; LHWs were encouraged to visit all pregnant women twice during pregnancy, within 24 h of birth and four times in the first postnatal month and were encouraged to link up with local Dais; LHWs were supported by the creation of voluntary community health committee which helped to do community education group sessions; TBAs received a voluntary training programme in basic newborn care	The government's LHW-training programme continued as usual, with regular refresher sessions, but no attempt was made to link LHWs with the TBAs; special training in basic and intermediate newborn care was offered to all public-sector rural health centre and hospital-based medical and nursing staff, irrespective of whether the intervention was implemented in their community	The average rate of stillbirth decreased from 65·9 to 43·1 per 1000 births (Mantel-Haenszel RR 0·66, 0·53–0·83, p<0·001), while the neonatal mortality rate decreased from 57·3 to 41·3 per 1000 livebirths (0·72, 0·56–0·91, p=0·006); the proportion of deliveries by skilled attendants at public-sector facilities also increased, from 18% at baseline to 30%, whereas the proportion of home births decreased from 79% to 65%
Baqui (2008), Sylhet, Bangladesh[27]	Cluster randomised controlled trial	Intervention 1: Home-care model with training of CHWs in BCC and ENC; CHWs visited pregnant women in antenatal and postnatal period to promote preparedness for birth or newborn care, to provide iron folate supplements, and to counsel on breastfeeding issues; also included home screening, management, or referral of sick newborns; Intervention 2: community-care model with community meetings with pregnant women and family members and advocacy meetings with local leaders; TBA training on cleanliness during delivery, maternal danger signs, and newborn care; specific recruitment of volunteer community-resource people to improve attendance at community meetings, and care-seeking for maternal and neonatal complications	Government health-system strengthening, including refresher training for facility-level health providers in treating neonatal infections and supply of antibiotics for treatment of neonatal infections at facilities	Neonatal mortality was reduced in the home-care arm by 34% (adjusted RR 0·66, 0·47–0·93) during the last 6 months versus that in the comparison arm; no mortality reduction was noted in the community-care arm (0·95, 0·69–1·31)
Darmstadt (2005), Shivgarh, India[26]	Cluster randomised controlled trial	CHWs provided ENC preventive package through home visits to community-newborn care stakeholders and households, with or without thermospot for detecting hypothermia; CHWs promoted preventive package of ENC including skin-to-skin care using behaviour-change management through group meetings and home visits; the target groups included community stakeholders, newborn care stakeholders, households; CHWs provided two antenatal and two postnatal household visits	Usual services of governmental and non-governmental organisation providers in the area	Improvements in birth preparedness, hygienic delivery, thermal care (including skin-to-skin care), umbilical-cord care, skin care, breastfeeding, and care-seeking were observed in intervention arms; adjusted neonatal mortality rate in the ENC arm and the ENC plus thermospot arms was lower by 51% (0·49, 0·38–0·63) and 47% (0·53, 0·38–0·74), respectively

TBA=traditional birth attendants. CHW=community health worker. LHW=lady health worker. OR=odds ratio. RR=relative risk. BCC=behaviour change communication. ENC=essential newborn care.

Table 3: **Controlled trials of community-based intervention packages**

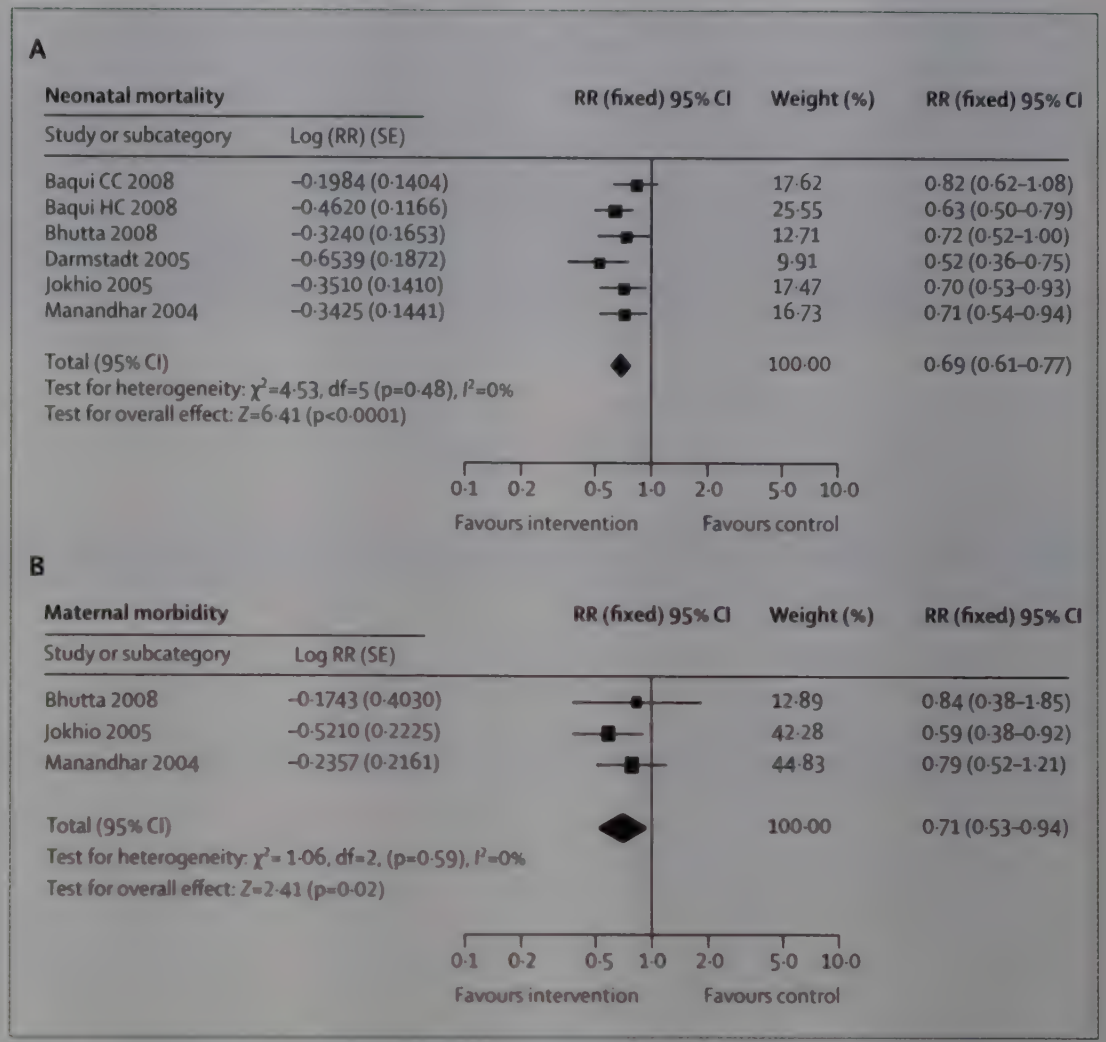
interventions suitable for delivery in first-level facilities, including basic emergency obstetric and newborn care as well as treatment of common serious childhood illnesses; and interventions to improve the continuity of care within and between these levels.

Our principal objective was to identify interventions that could be implemented through existing workers and to make cases for new approaches, if needed. We recognise the diversity of health systems with regards to the availability and feasibility of providing caesarean

section and blood transfusion as primary health care, and thus we also assessed the feasibility and additional effect of providing this intervention with the appropriate transport mechanisms either in first-level facilities or with referral to second-level facilities.

We systematically analysed all interventions with the potential to affect MNCH outcomes with a focus on studies in primary care settings in low-income and middle-income countries. Webtable 2 lists a range of interventions selected for review and those that were excluded. Our principal aim was to update the evidence base of recognised MNCH and nutrition interventions reported in recent reviews[1–9,11] and to identify additional feasible and cost-effective interventions, which, although potentially suitable for implementation in primary care settings, have not as yet been implemented. We recognised that although randomised controlled trials provide the most robust evidence, they are not always feasible. Thus, the potential effects of interventions such as emergency caesarean section[15,18] or antiretroviral therapy in developing countries[19] were estimated from appropriate observational studies.

We drew a clear distinction between interventions representing specific biomedical agents (such as antibiotics, vaccines, oral rehydration solution, etc) and delivery strategies that relate to mechanisms for increasing their uptake at various levels (such as mass media use, community support groups, and education strategies). We also assessed the evidence base for specific delivery platforms for MNCH interventions in primary care settings, such as community support groups (especially for women), mass media use, social marketing schemes, and the Integrated Management of Childhood Illness.[20–25] Recent large-scale programmes that delivered MNCH and nutrition interventions in an integrated manner were also reviewed. We assessed supportive strategies, which though indirect, might influence care-seeking behaviours and outcomes in primary care settings including those that addressed women's empowerment and poverty alleviation (such as conditional cash transfers, voucher schemes, etc). In particular, we reviewed the evidence from four recent cluster randomised trials and two non-randomised studies with community workers in various settings in south Asia[26–31] with respect to maternal, perinatal, and newborn outcomes. These studies used various interventions at a community level to promote domiciliary care and improved care-seeking, including community support groups, training of community health workers including public-sector trained staff, workers from non-governmental organisations, and volunteers. In some instances, linkages with the health-system facilities and related staff training was a part of the project.[27,28,30] Although clearly important, other more basic interventions, such as education and literacy promotion, infrastructure development, political reform, untargeted cash transfers as well as poverty alleviation, microcredit schemes, and employment strategies were not reviewed.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Neonatal mortality
Study or subcategory
Log (RR) (SE)
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Baqui CC 2008 −0·1984 (0·1404) 17·62 0·82 (0·62–1·08)
Baqui HC 2008 −0·4620 (0·1166) 25·55 0·63 (0·50–0·79)
Bhutta 2008 −0·3240 (0·1653) 12·71 0·72 (0·52–1·00)
Darmstadt 2005 −0·6539 (0·1872) 9·91 0·52 (0·36–0·75)
Jokhio 2005 −0·3510 (0·1410) 17·47 0·70 (0·53–0·93)
Manandhar 2004 −0·3425 (0·1441) 16·73 0·71 (0·54–0·94)
Total (95% CI) 100·00 0·69 (0·61–0·77)
Test for heterogeneity: χ²=4·53, df=5 (p=0·48), I²=0%
Test for overall effect: Z=6·41 (p<0·0001)
0·1 0·2 0·5 1·0 2·0 5·0 10·0
Favours intervention
Favours control
B
Maternal morbidity
Study or subcategory
Log RR (SE)
RR (fixed) 95% CI
Weight (%)
RR (fixed) 95% CI
Bhutta 2008 −0·1743 (0·4030) 12·89 0·84 (0·38–1·85)
Jokhio 2005 −0·5210 (0·2225) 42·28 0·59 (0·38–0·92)
Manandhar 2004 −0·2357 (0·2161) 44·83 0·79 (0·52–1·21)
Total (95% CI) 100·00 0·71 (0·53–0·94)
Test for heterogeneity: χ²= 1·06, df=2, (p=0·59), I²=0%
Test for overall effect: Z=2·41 (p=0·02)
0·1 0·2 0·5 1·0 2·0 5·0 10·0
Favours intervention
Favours control

Figure 3: **Estimates of effects of community interventions on neonatal mortality and maternal morbidity**
Data presented separately for the home care (HC) and the community care (CC) arms of the Baqui study.

We specifically sought information on interventions that had assessed delivery of maternal, newborn, and child health and nutrition interventions together and outcomes relevant to the reported major causes of maternal, newborn, and child mortality.[32–34] We based the final selection of interventions for possible delivery in primary care settings on three approaches. We used the GRADE criteria for assessing the quality of evidence and pragmatic recommendations for inclusion in primary care settings,[17] on the basis of additional information on cost-effectiveness[3,5,35–37] and feasibility for inclusion within primary care settings with various care providers and possible delivery strategies in target high-mortality countries.[11] The latter was determined by consensus among the authors and several MNCH experts from whom advice was specifically solicited.

Description of the impact model

We specifically assessed the burden of maternal, newborn, and child mortality for Pakistan and Uganda on the basis of recent information available from the Countdown report[38] and demographic and health survey for Pakistan.[39] We estimated the numbers and proportions of maternal, neonatal, and postneonatal child deaths that could be averted in each of our country case studies, by increasing the coverage of effective interventions deliverable at the

	Reasons for selection			Potential delivery strategies and platforms§						
	Evidence of effect on morbidity or mortality[17]*	Cost-effectiveness [35–37]†	Evidence and potential for delivery and inclusion in primary care programmes‡	Mass media (including social marketing strategies, health days, etc)	Facilitated community support and advocacy groups	Community health workers with limited training	Trained community health workers (outreach workers)	Community-based trained midwives	Other cadres of health workers (EPI vaccinators, dispensers)	Medical or nursing staff in first-level facilities (IMCI trained)
Promotional interventions										
Promotion of reproductive health and family planning	1	B	1	++	+	+	++	++		++
Promotion of appropriate care seeking and antenatal care during pregnancy	2	A	1	++	++	++	++	++	+	++
Promotion of skilled care for childbirth	1	B	1	++	++	++	++	++	+	++
Exclusive breastfeeding advice and support	1	A	1	+	+	++	++	++	+	++
Preventive interventions										
Provision/availability of contraceptives for birth spacing and safe sex	1	A	1	..	..	+	++	+	..	++
Cord care and clean delivery kits	1	A	1	..	+	++	++	++	+	++
Iron folate or multiple micronutrient supplementation during pregnancy	2	A	2	..	..	+	+	+	+	++
Balanced protein-energy supplements during pregnancy in food-insecure populations	1	C	2	..	+	+	+	..	..	+
Calcium supplementation for PIH	2	A	2	..	..	+	++	++	..	++
Low-dose aspirin in pregnancy for at-risk women	1	A	2	..	..	+	++	++	..	++
Antiretrovirals in HIV-infected individuals and PMTCT	1	B	1	..	..	..	+	+	+	++
Antibiotics for preterm rupture of membranes	1	C	2	..	..	..	++	++	..	++
Antenatal steroids in preterm labour	1	C	2	..	..	..	+	++	..	++
EPI (including additional new vaccines Hib, pneumococcal and rotavirus vaccines)	1	B	1	+	..	..	..	..	++	++
Vitamin A supplementation in children	1	A	1	+	+	+	++	+	+	++
Preventive zinc supplementation/ fortification for children	1	B	1	+	+	+	++	+	+	++
Insecticide-treated bednets for the family	1	A	1	+	+	+	++	+	+	+
IPT for prevention of malaria in pregnancy and children with IPT	1	A	1	+	+	+	++	++	+	++
Treatment interventions										
Promotion and use of skilled birth attendants in first-level and second-level facilities	2	A	2	+	+	+	++	++	+	++
Interventions for prevention of post-partum haemorrhage and use of oxytocic agents	1	B	2	+	+	+	+	++	..	++
Basic newborn resuscitation with self inflatable bag and mask	2	A	2	..	..	..	+	++	..	++
Improved diarrhoea management (zinc and ORT etc)	1	B	1	+	+	++	++	+	++	++
Community detection and management of pneumonia with short course amoxicillin	1	B	1	+	+	..	++	+	++	++
Improved case management of malaria including ACTs	1	B	1	+	+	+	++	+	++	++
Recognition, triage and treatment of severe acute malnutrition in affected children in community settings	1	C	1	+	+	+	++	+	++	++

*1=strong evidence of benefit in efficacy and effectiveness settings and recommended; 2=moderate level of evidence of impact but need recommended for inclusion in health systems; 3=low level of evidence but recommended for further evaluation in health systems on additional criteria and plausibility. †A=international US$15–47 per DALY averted; B=international US$48–1000 per DALY averted; C=international >US$1000 per DALY averted; NA=not available. ‡1=strong evidence of benefit in efficacy and effectiveness settings; 2=plausible and promising evidence of impact but need evaluation in health systems at scale; 3=promising interventions that need further assessment in primary care settings. §++=principal responsibility or delivery platform for the intervention, +=additional task (utility of opportunity). PIH=pregnancy-induced hypertension. PMTCT=prevention of mother to child transmission. EPI=expanded programme for immunisation. IPT=intermittent preventive treatment for malaria. ORT=oral rehydration therapy. ACT=artemesin combination therapy.

Table 4: **Evidence-based community-based integrated MNCH interventions and delivery strategies that should be integrated in primary care**

	Reasons for selection			Potential delivery strategies and platforms§						
	Evidence of impact on morbidity or mortality*	Cost-effectiveness†	Evidence and potential for delivery and inclusion in primary care programmes‡	Mass media (including social marketing strategies, health days etc)	Facilitated community support and advocacy groups	Community health workers with limited training	Trained community health workers (outreach workers)	Community-based trained midwives	Other cadres of health workers (EPI vaccinators, dispensers)	Medical/ Nursing staff in first-level facilities
Promotional interventions										
Promotion of basic newborn care and care of the LBW infant	2	B	2	+	+	+	++	++	+	++
Counselling for adequate nutrition and iron folate supplements during pregnancy	2	B	2	+	++	+	+	++	+	++
Complementary feeding promotion through community education in food-secure populations	2	NA	2	++	+	++	++			+
Preventive interventions									+	++
Provision of food supplements for complementary feeding in food-insecure households	2	C	2	+	++	++	++	+	++	++
Iron supplementation for children in non-malarial populations	1	B	2	+	+	+	++	--	+	++
Treatment interventions										
Use of MgSO4 for management of PIH or preterm labour	1	NA	2	--	--	+	+	++		++
Basic newborn resuscitation with self-inflatable bag and mask	2	C	2	--	--	--	+	++	--	++
Community-based triage and management of serious infections in newborns (including pneumonia)	2	B	2	--	--	--	+	++	--	++
Recognition, triage and treatment of severe acute malnutrition in affected children in community settings	1	C	1	+	+	+	++	+	++	++

*1=strong evidence of benefit in efficacy and effectiveness settings and recommended; 2=moderate level of evidence of impact but need recommended for inclusion in health systems; 3=low level of evidence but recommended for further evaluation in health systems on additional criteria and plausibility. †A=international US$15–47 per DALY averted, B=international US$48–1000 per DALY averted; C=international >US$1000 per DALY averted; NA=not available. ‡1=strong evidence of benefit in efficacy and effectiveness settings, 2=plausible and promising evidence of impact but need evaluation in health systems at scale; 3=promising interventions that need further assessment in primary care settings. §++=principal responsibility or delivery platform for the intervention; +=additional task (utility of opportunity). EPI=extended programme for intervention. LBW=low birth weight. PIH=pregnancy induced hypertension.

Table 5: **Community-based integrated MNCH interventions and delivery strategies that need further assessment at scale for possible inclusion in primary care programmes affecting survival**

primary care level. The effect of individual interventions on specific causes of mortality was estimated (table 1 and webtables 3–5). The input data for cause-specific maternal, neonatal, and postneonatal child deaths, as well as estimates of current coverage of interventions, were also derived from these recent estimates (webtable 6) and when absent, by expert opinion among the authors.

The potential effect of family-planning strategies and increased birth spacing was estimated for all-cause maternal mortality on the basis of current levels of coverage. Because of the lack of reliable information on the burden of maternal haemorrhage-related deaths due to pre-existing iron deficiency, we assumed a small but plausible proportion of maternal deaths attributed to anaemia (40%), which could be averted by blood transfusion in first-level facilities. Although we also recognised a potential effect on maternal deaths related to unwanted pregnancies and abortions, we did not model the effect of provision of safe abortion services, but included postabortion care in the model. Some information on child deaths from severe acute malnutrition was available for Pakistan but not Uganda. We were thus unable to include the effect of treatment strategies for severe acute malnutrition in the latter case study. Although the potential of routine zinc supplementation to prevent childhood morbidity and mortality is well known,[17] we did not include this in the modelling exercise for Pakistan and Uganda as delivery strategies are lacking.

See Online for webtables 3–5

See Online for webtable 6

The intervention effects were then applied to estimates of the current numbers of deaths from each cause assuming that the population effect increases linearly with coverage. The number of deaths prevented for a given cause of death by a given intervention was calculated as:

$$\text{Deaths prevented} = \frac{N \times I \times (P_1 - P_0)}{(1 - I \times P_0)}$$

N=number of deaths prior to intervention
I=percentage by which intervention reduces deaths
P_0=existing coverage of intervention
P_1=target coverage for intervention

For each intervention, the number of deaths due to a given cause and prevented by that intervention was subtracted from the current number of deaths, before calculating the effect of the next intervention. We estimated effects on the basis of two approaches: estimation of effect at universal coverage (99%) and a pragmatic scale-up of interventions to levels thought feasible within primary health care in the short term calculated as follows: targeting 30% coverage where current coverage of interventions is up to 15%, 50% where current coverage is 16–30%, 70% from current coverage rates of 30–50%, and 90% or 99% where current coverage rates of interventions are 50–80% and greater than 80%, respectively.

Results

The details of the review and findings from the subset of studies done in relevant primary health-care settings with integrated MNCH outcomes will be reported elsewhere, and are available from the authors upon request. Webtables 3–5 summarise the pathways by which interventions that are feasible in primary health-care settings might effect maternal, newborn, and child mortality and provide cause-specific estimates of their effects. The paucity of studies reporting outcomes across the continuum of maternal, newborn, and child health was striking. Although several maternal interventions have potential effects on the health of both the mother and the child, only a small proportion of studies report both. Only about a third (36%) of studies reported outcomes across the continuum of pregnancy, childbirth, and the neonatal period (figure 2).

Table 1 presents the MNCH interventions and those that appear promising for primary care settings.[40–72] Several interventions relevant for maternal health could be integrated with existing antenatal care packages for the prevention of pregnancy-induced hypertension and pre-eclampsia, including administration of calcium in deficient populations[41,42] and the use of low-dose aspirin for at-risk women.[40] However, we could identify no studies using both agents together in primary care settings. There is strong evidence of the benefits of magnesium sulfate for the prevention and management of eclampsia and this intervention should be included in the repertoire of management strategies in first-level health facilities.[49] The supervised use of oxytocics in health facilities[43] as part of the active management of the third stage of labour[44] reduces the risk of haemorrhage after birth. A complication regarding the provision of oxytocics is the need for refrigeration and parenteral dosing. Oral misoprostol is an alternative to oxytocics for the prevention and treatment of haemorrhage after birth in first-level facilities without refrigeration,[73] and might reduce the need for blood

	Reasons for selection			Potential delivery strategies and platforms§						
	Evidence of impact on morbidity or mortality*	Cost-effectiveness†	Evidence and potential for delivery and inclusion in primary care programmes‡	Mass media (including social marketing strategies, health days)	Facilitated community support and advocacy groups	Community health workers with limited training	Trained community health workers (outreach workers)	Community-based trained midwives	Other cadres of health workers (EPI vaccinators dispensers)	Medical/ nursing staff in first-level facilities
Promotional intervention										
Counselling for STD and HIV prevention	2	B	1	++	++	++	++	++	+	++
Conditional Cash Transfers for promoting health care and nutrition in poor households	2	C	2	+	+	..	..	..	..	+
Preventive interventions										
STD screening and management during pregnancy, especially syphilis	2	C	2	+	+	+	++	++	+	++
Promotion of WASH strategies and household practices, including large -scale sanitation projects	2	C	2	++	+	++	++	++	+	++
Treatment interventions										
Deworming in children	2	C	2	+	..	..	+	..	+	++
Rehabilitation										
Maternal mental-health interventions	2	C	3	+	++	..	+	++	..	++
Continued care and rehabilitation of undernourished children	2	C	3	+	++	+	++	+	+	+
Early child development interventions	3	C	3	+	++	..	+	++	+	+

*1=strong evidence of benefit in efficacy and effectiveness settings and recommended; 2=moderate level of evidence of impact but recommended for inclusion in health systems; 3=low level of evidence but recommended for further evaluation in health systems on additional criteria and plausibility. †A=international US$15–47 per DALY averted; B=international US$ 48–1000 per DALY averted; C=international >US$1000 per DALY averted; NA=not available. ‡1=strong evidence of benefit in efficacy and effectiveness settings; 2=plausible and promising evidence of impact but need evaluation in health systems at scale; 3=promising interventions that need further assessment in primary care settings. §++=principal responsibility or delivery platform for the intervention; +=additional task (utility of opportunity). EPI=extended programme for intervention. STD=sexually transmitted disease. WASH=water sanitation and hygiene.

Table 6: **Community-based integrated MNCH interventions and delivery strategies that need further assessment befor inclusion in primary care programmes affecting outcomes other than survival**

transfusion by 69% (95% CI 0·10–0·94).[74] However, there is the need for further studies in representative primary care settings before this can be recommended for large-scale use in community settings by various cadres of workers. Webtable 7 summarises the findings from the review of programmes that integrated various MNCH, family planning, and nutrition interventions at scale and assessment of their effect.

Supportive strategies for increasing uptake, as well as delivery platforms for integration of interventions, including conditional cash transfers, voucher schemes, reduction in user fees, use of mass media, and community support groups are summarised in table 2.[75–84] These strategies for scaling up and integrating interventions are discussed further elsewhere in this series.[16] Of these delivery platforms, interventions that operate through engagement of community health workers and community support groups are of special interest, because of the direct links with primary health-care interventions and their potential uptake by families and communities.

See Online for webtable 7

Several recent cluster randomised[26–28] and controlled trials[30,31] assessed the effect of training of community health workers (table 3). Although the details of approaches differed, a common thread in all of these recent studies was community engagement and participation and in all but two projects,[26,28] a link with the local health system. In three studies,[26,29,30] a strategy of community-based group counselling was used. A description and meta-analysis of the study findings are given in the webappendix. In summary, taken together, the studies provide strong evidence of reductions in neonatal mortality (relative risk [RR] 0·69, 95% CI 0·61–0·77; figure 3), perinatal mortality (0·71,

See Online for webappendix

Panel 1: Effect of primary health-care interventions on maternal, newborn, and child mortality in Pakistan

Pakistan reached a population of 160 943 000 in 2006, 51% are males. Pakistan has significant challenges in its health system and lags behind its MDG-4 and MDG-5 targets. Between 1970 and 2000, Pakistan more than doubled in population to 144 million from 60 million. During this time the number of people age 15–49 years more than tripled to 68 million from 14 million. As the number of people in that age group rose, so did demand for maternal and child health care. The maternal mortality rate (per 100 000 livebirths) fell from 500 in 2000 to 320 in 2006. Neonatal mortality was 57 per 1000 livebirths in 2000. The decrease in mortality in children age less than 5 years is also not impressive. In 1991, mortality in children under 5 years of age was 130 deaths per 1000 livebirths, this decreased to 97 in 2006. The demographic and health survey in 2007[39] confirmed these trends and indicates that the maternal mortality is 276 per 100 000 births, with corresponding newborn, infant, and mortality in children age younger than 5 years of 54, 78, and 94 per 1000 livebirths, respectively (figure 4).

There are wide differentials in health indicators between strata of the population, and to narrow the urban–rural divide, the government initiated the lady health workers programme in 1994 with the specific mandate of preventive MNCH services. These health workers are based in rural villages, cover a population of about 1000–1500 each, and operate with links to basic health units and rural health centres. However, current coverage and technical content of various interventions remain low. We assessed the potential effect of an improved repertoire of preventive and curative MNCH services delivered at primary health-care level in Pakistan with available health workers at two levels of coverage: a pragmatic increment from current levels and universal (99%) coverage. We also assessed the incremental benefit of providing emergency obstetric care with instrumental delivery and caesarean section at rural health centres on maternal mortality. Tables 7 and 8 indicate the effect of an improved and expanded repertoire of MNCH interventions on cause-specific maternal, newborn, and child mortality at primary health-care level in Pakistan. We estimate that improvements to family-planning services and birth spacing could save an additional 8–24% of maternal deaths at different levels of coverage.

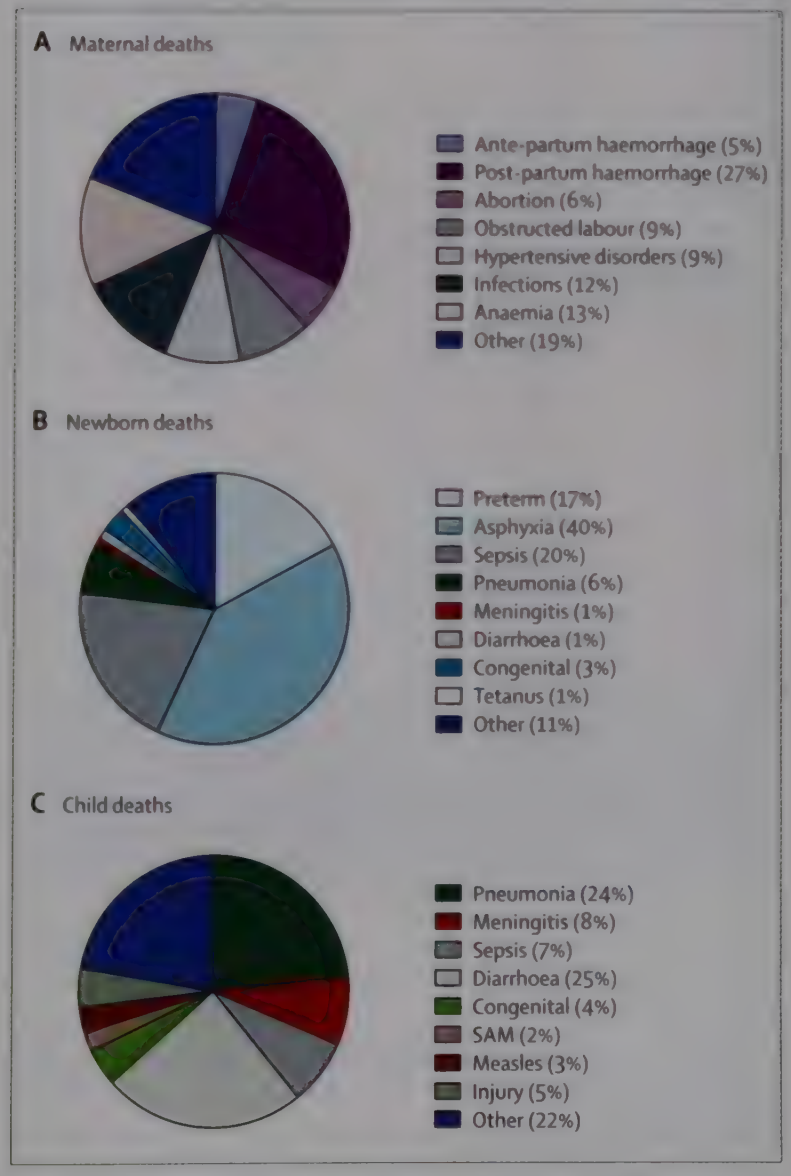

Figure 4: **Major causes of maternal (A), newborn (B), and child (C) deaths in Pakistan**
SAM=severe acute malnutrition.

	Proportion of death by cause	With caesarean section		Without caesarean section	
		Death averted at pragmatic coverage	Death averted at 99% coverage	Death averted at pragmatic coverage	Death averted at 99% coverage
Ante-partum haemorrhage	5·0%	5%	29%	0·0%	0·0%
Post-partum haemorrhage	27·0%	23%	72%	18·0%	54·0%
Abortion	6·0%	10%	34%	10·0%	34·0%
Obstructed labour	9·0%	10%	57%	0·0%	0·0%
Hypertensive disorders	9·0%	31%	83%	31·0%	83·5%
Infections	12·0%	13%	87%	31·0%	87·0%
Anaemia	13·0%	7%	51%	7·4%	24·0%
Miscellaneous	19·0%	0%	0%	0·0%	0·0%
Total	100·0%	23·1%	63·9%	20·0%	52·5%

Table 7: **Cause-specific maternal deaths in Pakistan prevented with and without caesarean capacity at pragmatic and 99% target coverage**

	Proportion of death	Deaths averted	
		Death averted at pragmatic coverage	Death averted at 99% coverage
Neonatal deaths			
Preterm	17·0%	23%	61%
Asphyxia	40·0%	20%	51·7%
Sepsis	20·0%	35%	77·3%
Pneumonia	6·0%	16%	42·9%
Meningitis	1·0%	0%	0·0%
Diarrhoea	1·0%	12%	27·8%
Congenital	3·0%	2%	6·4%
Tetanus	1·0%	67%	84·1%
Others	11·0%	0%	0·0%
Total	100·0%	21%	50%
Postneonatal child deaths			
Pneumonia	23·2%	44%	77%
Meningitis	8·4%	36%	61%
Sepsis	7·4%	21%	0%
Diarrhoea	24·4%	46%	82%
Congenital	4·4%	0%	0%
SAM	2·0%	18%	46%
Measles	3·2%	63%	86%
Injury	4·8%	3%	10%
Others	22·1%	0%	0%
Total	100%	29%	58%

SAM=severe acute malnutrition.

Table 8: **Cause-specific neonatal and child deaths in Pakistan prevented with primary health-care interventions at pragmatic and 99% target coverage**

0·61–0·84), and maternal morbidity (0·71, 0·53–0·94; figure 3).

In our review of effective interventions and recent developments, we were able to identify 42 MNCH interventions with the potential to improve outcomes in primary health care. Of these, 25 could be classified as those where the evidence of effect, cost-effectiveness, and plausibility for inclusion within primary care was sufficient for inclusion in programmes through a range of care providers and delivery platforms. Although most of these are interventions that should be delivered universally, some were considered situational (for specific situations such as malaria-endemic areas or food-insecure populations). Table 4 lists these interventions alongside the delivery strategies or platforms that have the potential to be scaled up in primary care settings. An additional nine interventions were identified with the potential to improve MNCH outcomes but need further assessment in large-scale demonstration projects and effectiveness studies (table 5). Several interventions with emerging evidence of effect on morbidity and other outcomes, such as mental health and child development, could also be included within the remit of primary health care workers and programmes (table 6) but are not included in our suggested packages.

We further assessed the feasibility and potential effectiveness of introducing a core package of interventions (tables 5 and 6) in two different health systems representing countries with high burdens of maternal, newborn, and child mortality. Panels 1 and 2 present the country case studies from Pakistan and Uganda based on available information on cause-specific mortality, health-system functionality, available human capacity in primary care settings and both existing and potentially feasible interventions within programmes. The model predicted that including a repertoire of evidence-based interventions into MNCH programmes at pragmatic levels of coverage in primary health-care settings in these two countries could prevent 20–30% of all maternal deaths (increasing to 23–32% with caesarean capability at first-level facilities), 20–21% of newborn deaths and 29–40% of all postneonatal deaths before age 5 years (tables 7–10). Figure 6 indicates the potential effect on major causes of maternal, newborn, and child deaths if interventions were provided at pragmatic as well as 99% coverage.

Discussion

Our review reaffirms that primary health-care interventions can make a significant difference to MNCH and

mortality outcomes. The two country case studies and modelling exercise were done with existing health-system capacity and care providers in mind, setting realistic short-term coverage targets. These studies indicate that even without delivering care through secondary-care hospitals, substantial advances can be made if interventions are made available through primary health care (service availability at household and community level and first-level facilities).

Integration of primary health-care service has been defined as "a variety of managerial or operational changes to health systems to bring together inputs, delivery, management and organisation of particular service functions" with the aim of improving efficiency and quality of services and making the best use of resources and opportunities.[12] Other definitions have emphasised linkages with sectors outside of the health system.[85] Although our review did reveal several small or medium-scale programmes that had attempted integration of health, nutrition, and reproductive-health interventions, we found few studies or programme descriptions that had successfully integrated MNCH strategies at programme level, combining a range of promotive, preventive, treatment, and rehabilitation interventions. Of the few other examples, most were small in scale, largely consisting of integration of family-planning services with MNCH services and none had been independently assessed or provided robust effect estimates (webtable 6). This lack of evidence is a reflection of poor investments, and our analysis therefore focuses on what can be done rather than what has been done.

Four main factors have contributed to failure to deliver effective MNCH interventions at scale. First, lack of a universally agreed minimum set of interventions that should be delivered to all women, newborns, and children who need them. Second, lack of attention to demand creation at community-level and strategies to promote changes in care seeking and behaviour. Third, shortage of well trained staff, accompanied by reservations about task shifting from more highly trained workers to those with shorter training and an absence or shortage of community-based workers to promote good family care and care-seeking practices and to deliver simple curative interventions, is a key barrier in many settings. Fourth, failure to allocate the resources needed to ensure the

***Panel 2:* Effect of primary health-care interventions on maternal, newborn, and child mortality in Uganda**

Uganda had a population of 29 899 000 in the demographic and health survey of 2006, of which 5 840 000 are age less than 5 years. The country is struggling to bridge the gap between its present maternal mortality (550 per 100 000 livebirths in 2005), neonatal mortality (32 per 1000 livebirths in 2000), and mortality in children age younger than 5 years (134 per 1000 livebirths in 2006), and its MDG targets. Figure 5 shows the major causes of maternal, newborn, and child deaths in Uganda.

The proportion of the population living below the poverty line (earning <US$1 a day) is 84·9%. The 2006 Ugandan demographic and health survey measured 435 maternal deaths per 100 000 livebirths. Infant mortality declined from 89 deaths per 1000 livebirths in 2000–01 to 75 in 2006. Mortality in children age younger than 5 years declined from 158 deaths per 1000 livebirths to 137. Overall prevalence of tuberculosis is high (646 per 100 000 population in 2004) and HIV prevalence in the population aged 15–49 years was 4·1% in 2003. Although only 7·3% of the gross domestic product is spent on health overall coverage rates for antenatal care and childhood immunisations remains high and well above the average for Africa. Human resources for health are a bottleneck; the physician density per 1000 population was 0·08 in 2004, while that for nurses and midwives was 0·61 and 0·116, respectively. Tables 9 and 10 indicate the effect of an improved and expanded repertoire of MNCH interventions on cause-specific maternal, newborn, and child mortality at primary health-care level in Uganda. We estimate that improvements to family-planning services and birth spacing could save an additional 15–44% of maternal deaths at different levels of coverage.

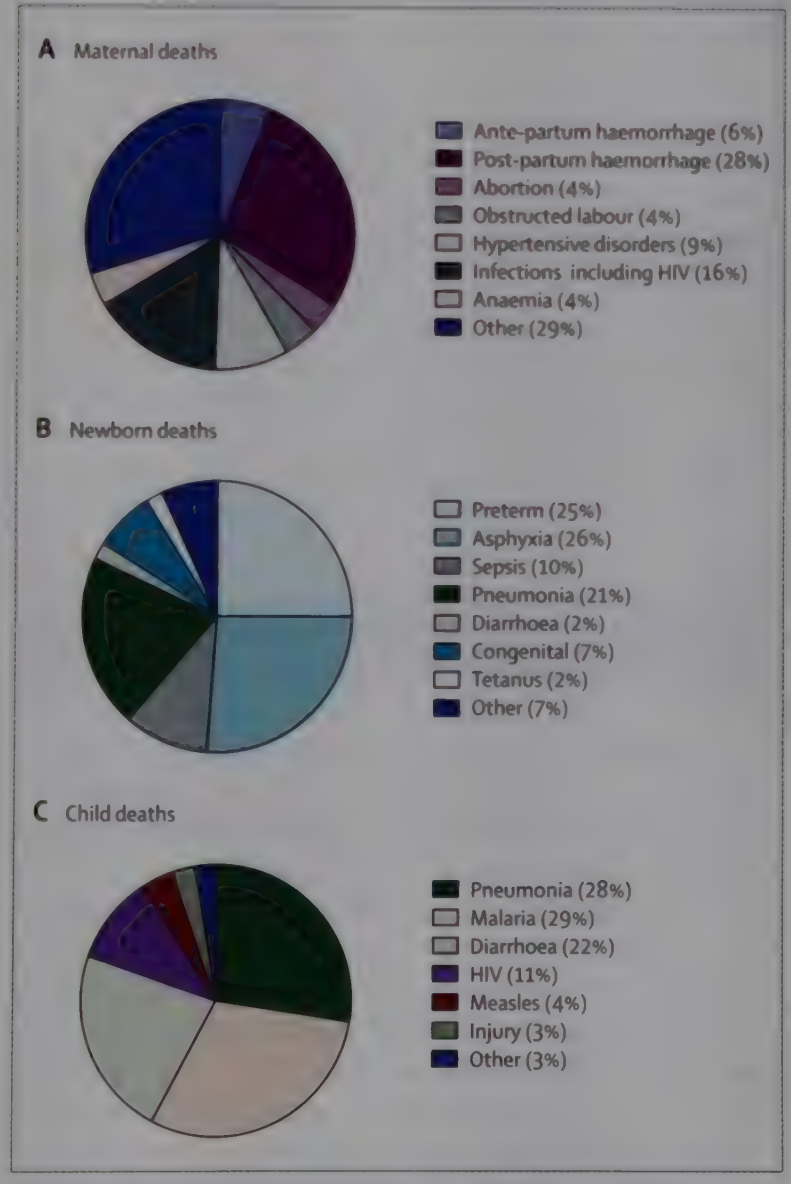

Figure 5: **Major causes of maternal (A), newborn (B), and child (C) deaths in Uganda**

	Proportion of death by cause	With caesarean section		Without caesarean section	
		Death averted at pragmatic coverage	Death averted at 99% coverage	Death averted at pragmatic coverage	Death averted at 99% coverage
Ante-partum haemorrhage	5·8%	5·1%	29·0%	0·0%	0·0%
Post-partum haemorrhage	28·2%	24·0%	76·0%	19·0%	61·4%
Abortion	4·0%	11·0%	35·0%	11·0%	35·0%
Obstructed labour	4·0%	10·3%	57·4%	0·0%	0·0%
Hypertensive disorders	9·0%	40·3%	79·0%	40·3%	79·0%
Infections	16·0%	43·9%	84·6%	43·9%	84·6%
Anaemia	4·0%	11·6%	51·5%	5·6%	24·5%
Miscellaneous	30·0%	0%	0%	0·0%	0·0%
Total	100·0%	31·6%	72·4%	29·6%	67·3%

Table 9: **Cause-specific maternal deaths in Uganda prevented with and without caesarean capacity at pragmatic and 99% target coverage**

	Proportion of death by cause	Deaths averted	
		Death averted at pragmatic coverage	Death averted at 99% coverage
Neonatal deaths			
Preterm	25·0%	23%	61·5%
Asphyxia	26·0%	16%	54·5%
Sepsis	10·3%	47%	65·2%
Pneumonia	20·7%	18%	29%
Diarrhoea	2·0%	14%	17·9%
Congenital	7·0%	2%	7·9%
Tetanus	2·0%	55%	78·8%
Others	7·0%	0%	0·0%
Total		20·0%	45·0%
Postneonatal child deaths			
Pneumonia	27·6%	45%	78%
Malaria	30·3%	46%	89%
Diarrhoea	22·4%	41%	84%
HIV	10·5%	25%	74%
Measles	3·9%	64%	81%
Injury	2·6%	3%	10%
Others	2·6%	0%	0%
Total	27·6%	40%	79%

Table 10: **Cause-specific neonatal and child deaths in Uganda prevented with PHC interventions at pragmatic and 99% target coverage**

functionality of first-level health facilities, regular supervision of staff in these facilities, and strong links between facility-based staff and community-based workers.

An understanding of the barriers to the delivery of MNCH interventions at scale in primary health care is crucial to the development of strategies for action. At the community level, all health issues are interlinked, especially for MNCH, although services within the health system do not cater equally to the needs of women, newborns, and children. In many countries care providers and outlets for reproductive health and family planning are distinct from those providing health care, and delivery strategies differ. Specifically, coverage of maternal and newborn care interventions, especially those for childbirth and early postnatal care, remains poor. This shortfall is probably related to the difficulty of providing 24 h services for acute or emergency care as opposed to preventive services, such as antenatal care or immunisations, that can be delivered to a predetermined schedule. A range of evidence-based interventions exist that can be provided and scaled up incrementally. These include promotive and preventive interventions as well as curative services that can be provided by skilled birth attendants and health-care providers in first level facilities.

Although the provision of services for instrumental deliveries and caesarean sections is a key intervention for maternal survival, our review and modelling exercise suggests that reasonable gains can still be made for maternal health and survival in primary health care by introducing a range of preventive interventions ranging from family planning or provision of contraceptives, through care seeking, clean delivery, pre-eclampsia prevention, and antenatal care to address maternal risk factors, such as anaemia and pregnancy-induced hypertension. The benefit of birth spacing on reducing all-cause maternal mortality is evident and highlights the need to integrate reproductive health and family planning services within MNCH activities. These strategies should be complemented with additional therapeutic interventions to address major causes of maternal mortality such as ante-partum and post-partum haemorrhage, infections, and eclampsia. Our impact estimates are conservative, and we did not include effects of several interventions, such as maternal benefits of promotion of clean delivery and care seeking for skilled care or zinc supplementation for prevention of childhood illness, in our model.

Ensuring universal access to skilled care for childbirth is a high priority. Pragmatically, because of the shortage of trained staff in many developing countries,[86] some intermediate-term and adjunctive strategies are needed. Options include the development and appropriate use of community health workers for delivering specific

promotive, preventive, and therapeutic interventions.[87] Several recent studies in south Asia suggest that community-based strategies, with various workers, to promote healthy household behaviours, community support, and use of facility services can make a difference to MNCH outcomes. In the recent pilot study in Hala, which used existing public-sector female health workers to deliver[30] promotional and preventive services through community-based women's groups and home visits, the findings of improved care seeking alongside a reduction in perinatal mortality are encouraging. The exact mechanisms through which community support groups lead to improved perinatal survival are complex and not well understood;[88] these might affect a range of issues, such as women's empowerment, increased awareness, and development of social capital affecting household and family practices and care seeking. In many poor rural communities there is a pervasive sense of fatalism around maternal and newborn care and these support groups may offer a unique mechanism for group counselling and promotion of positive behaviours.

Our criteria for selecting interventions for delivery in primary health care settings took account of a range of factors including effect, deliverability, and plausibility, criteria that have also been suggested by others for programme assessments.[89] We also took into account the range of delivery platforms possible in primary care settings, the types of health workers available as well as existing missed opportunities for interventions. In particular, the potential of increasing community engagement and demand creation was taken into account.

Although there is evidence from recent community-based studies that such an approach can make a significant difference to the management of newborn and childhood illnesses,[27,29,30,90] we emphasise that several issues must be kept in mind while developing and scaling up such approaches. Countries and district health services need to consider carefully the gains from developing a cadre of community health workers versus alternative approaches. In circumstances in which the primary care health system is reasonably functional and care seeking the norm, strengthening of facility-based health services and incentives and support (such as transport) to encourage use is likely to be more cost effective than the development of a new cadre of workers. In other instances making the most of existing opportunities for delivering interventions through existing health workers and contacts should be a priority. However, in populations with very low coverage, a cadre of community health workers working in tandem with facility-based health staff (both public and private), may be the most effective way to reach families and households in greatest need. Table 11 summarises options for delivering MNCH interventions, taking into account available resources and capacity (figure 7). These options

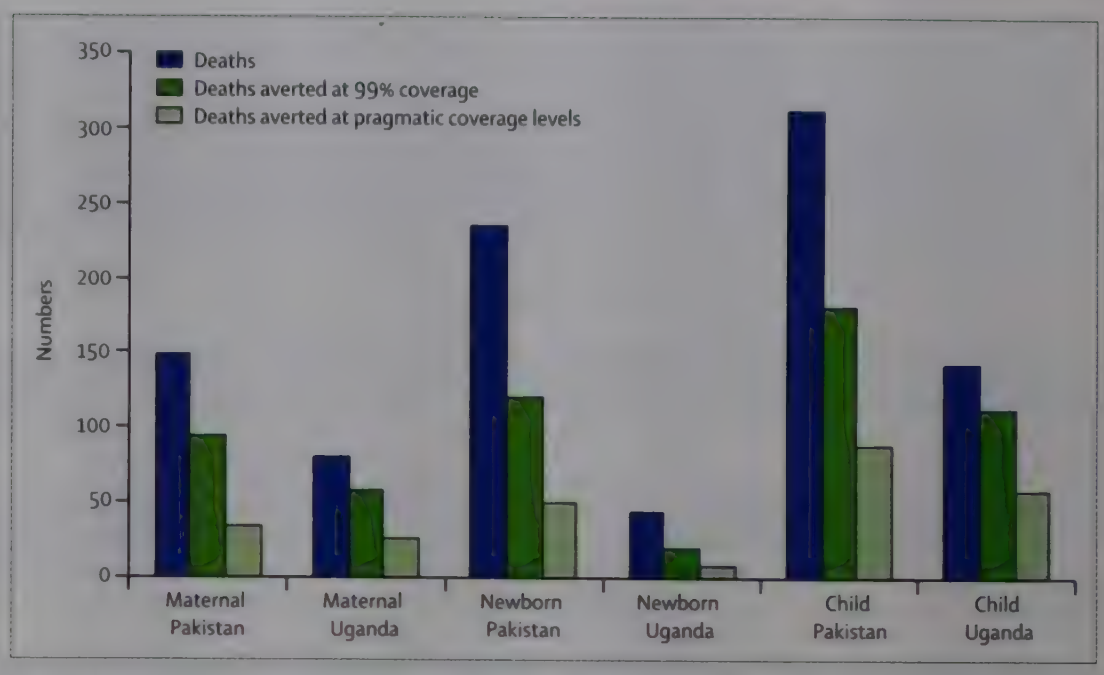

Figure 6: **Maternal, newborn and child deaths in Pakistan and Uganda**
Data are 100s of maternal and 1000s of newborn and child deaths averted by interventions at two levels of coverage.

make it possible to introduce an integrated model of community engagement and empowerment, and relevant and available health workers working in tandem with primary care health facilities. This framework also offers the potential of introducing newer interventions with the potential of improving health outcomes such as expanded antenatal care packages, mental health, and early child development interventions.

Although the development of a cadre of community health workers might be an appropriate short-term solution to pervasive MNCH problems, this effort should not detract from the need to strengthen the health system and the training of staff. Thus, such community-based approaches must be seen in the context of evolving health systems and roles. The barefoot doctors in China[91] and the Behvarz health workers in Iran[92] are cases in point. Barefoot doctors in China have been phased out as the health system strengthened. In Iran, the role of Behvarz workers has evolved from providing curative services to a largely promotive role as literacy rates have improved and the health system strengthened. Thus, although alternative strategies exist, such as training technicians to do caesarean sections[93] in situations where surgeons are not available, these measures must not replace concerted efforts to train an appropriate health workforce.

Community health workers are only one group of workers in primary care settings who require adequate support, training, and linkages with the formal health system.[94] The growing role, in many settings, of the private sector in delivering key interventions and promotion of MNCH services has been recognised,[95] as has been the role of performance-based financing of health care.[96] To be successful in delivering high coverage of key MNCH interventions, any strategy must take these realities into account and work with these providers to ensure the delivery of effective and appropriate

	Poorly developed or dysfunctional health systems with mostly home deliveries	Partly functional health system and mixed patterns of facility and home births	Well developed health system with mostly facility-based births
General strategies	Strengthen and staff first-level and second-level facilities; NGO contracting; monitoring and assessment; Scale-up social security networks and poverty alleviation strategies	Health system strengthening and governance reform; NGO contracting; Strengthening of referral systems and incentive schemes such as CCTs, vouchers, transport support etc; Monitoring and assessment (including district audits)	Monitoring and assessment; Strengthening health management information systems; Identify and target at-risk populations for interventions
Care before pregnancy care	General supportive strategies to promote reproductive health and nutrition counselling through mass media and education sector	General supportive strategies to promote reproductive health and nutrition through mass media and education sector	General strategies for information, education and communication
Care before pregnancy care	Community support groups	Community health workers and outreach workers (through support groups if contextually appropriate)	Promoting care through outpatient clinics
Care before pregnancy care	Nutrition support and poverty alleviation strategies such as CCTs	Training traditional birth attendants to provide supportive care and promote care seeking	..
Pregnancy care	Community health workers and trained birth attendants to provide basic package of antenatal care services	Community health workers and trained birth attendants to provide expanded package of antenatal care services	Skilled and trained attendants at facilities to provide the full package of antenatal care services
Pregnancy care	Training traditional birth attendants to provide supportive care and refer	Promoting antenatal care through outpatient clinics	..
Care during childbirth	Promotion of seeking skilled care for childbirth	Training available staff providing domiciliary birthing services and promotion of skilled birth attendance (nurses, midwives, etc)	Delivery in health facilities with skilled care providers
Care during childbirth	Training traditional birth attendants in the absence of local skilled attendants and linkages with skilled care in health facilities	Creation of a supportive role for traditional birth attendants, especially in perinatal/newborn care and family support	..
Post-partum & postnatal care	Training traditional birth attendants in maternal and newborn postnatal care	Trained community health and outreach workers	Promotion of routine postnatal care within primary care health facilities
Post-partum & postnatal care	Trained community health and outreach workers	Opportunities for delivery through ancillary health care workers (dispensers, vaccinators, etc)	..
Newborn care	Training traditional birth attendants in maternal and newborn postnatal care	Trained community health and outreach workers	Promotion of routine postnatal care within primary care health facilities
Newborn care	Trained community health and outreach workers	Opportunities for delivery through ancillary health care workers (dispensers, vaccinators, etc)	..
Infant and child care	Trained community health and outreach workers	Trained community health and outreach workers	Strengthen staff training for IMCI and supportive measures (eg, drug supplies and diagnostics, etc) in health facilities
Infant and child care	Expanded opportunities through ancillary health care workers (dispensers, vaccinators, etc)	Expanded opportunities through ancillary health care workers (dispensers, vaccinators, etc)	..

CCT=conditional cash transfers. NGO=non-governmental organisation. IMCI=Integrated Management of Childhood Illnesses.

Table 11: **Primary care MNCH delivery options in various scenarios**

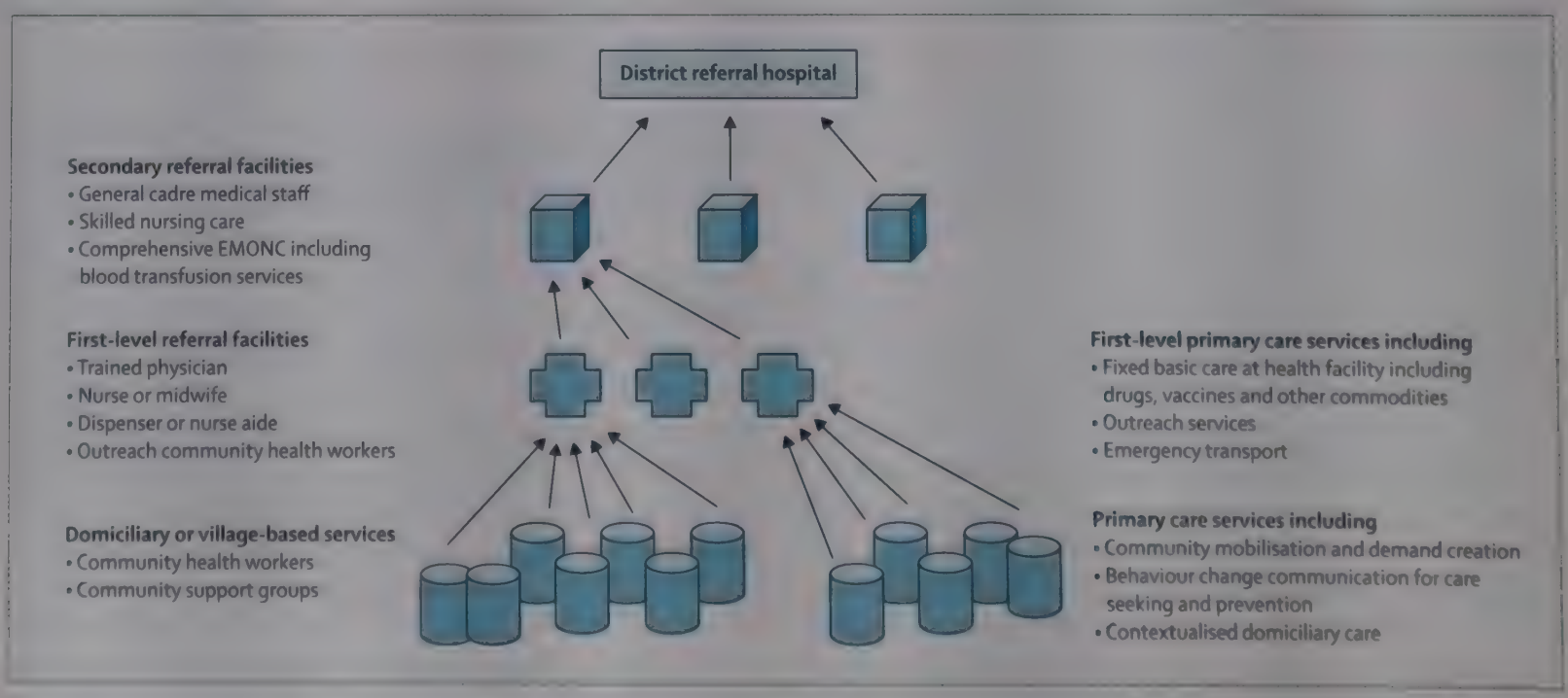
District referral hospital
Secondary referral facilities
• General cadre medical staff
• Skilled nursing care
• Comprehensive EMONC including blood transfusion services
First-level referral facilities
• Trained physician
• Nurse or midwife
• Dispenser or nurse aide
• Outreach community health workers
Domiciliary or village-based services
• Community health workers
• Community support groups
First-level primary care services including
• Fixed basic care at health facility including drugs, vaccines and other commodities
• Outreach services
• Emergency transport
Primary care services including
• Community mobilisation and demand creation
• Behaviour change communication for care seeking and prevention
• Contextualised domiciliary care

Figure 7: **Primary health-care interventions and support staff**
EMONC=emergency and newborn care

interventions. The key is to implement what we know works through all available and possible channels while building robust monitoring and assessment mechanisms. Given that almost 75% of the 68 countries with the greatest burden of maternal, newborn, and child deaths are off target to achieve MDG 4 and 5 goals, scaling up community-based primary care on the basis of what we know, is a moral imperative.

Contributors

ZB conceived of the concept for the review, obtained funding for the empirical analysis and wrote the first draft of the manuscript. The review of integrated MNCH interventions and outcomes was undertaken by SA and TMA and was overseen by ZB. The country-specific impact models for Pakistan and Uganda were developed by SC, ZB, SZB, PO, and AR. BAH, SC, and ZB undertook the pooled analysis of community trials for maternal and newborn care. All authors contributed to the analysis and writing process of the paper. ZB is the overall guarantor.

Conflict of interest statement

We declare that we have no conflict of interest.

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Alma-Ata: Rebirth and Revision 7

Integrating health interventions for women, newborn babies, and children: a framework for action

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See **Editorial** page 863
This is the seventh in a **Series** of eight papers about Alma-Ata: rebirth and revision

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For women and children, especially those who are poor and disadvantaged, to benefit from primary health care, they need to access and use cost-effective interventions for maternal, newborn, and child health. The challenge facing weak health systems is how to deliver such packages. Experiences from countries such as Iran, Malaysia, Sri Lanka, and China, and from projects in countries like Tanzania and India, show that outcomes in maternal, newborn, and child health can be improved through integrated packages of cost-effective health-care interventions that are implemented incrementally in accordance with the capacity of health systems. Such packages should include community-based interventions that act in combination with social protection and intersectoral action in education, infrastructure, and poverty reduction. Interventions need to be planned and implemented at the district level, which requires strengthening of district planning and management skills. Furthermore, districts need to be supported by national strategies and policies, and, in the case of the least developed countries, also by international donors and other partners. If packages for maternal, newborn and child health care can be integrated within a gradually strengthened primary health-care system, continuity of care will be improved, including access to basic referral care before and during pregnancy, birth, the postpartum period, and throughout childhood.

Introduction

Recent *Lancet* Series on maternal, newborn, and child health[1–3] have showed that evidence-based, cost-effective interventions can improve health outcomes in mothers, newborn babies, and children in low-income and middle-income countries. The experiences of several countries confirm that the health of women and children can be improved through carefully designed and incrementally implemented strategies.[4] These need to address barriers and constraints in many sectors, including health, education, infrastructure, water and sanitation, and social protection.[1–3,5–7] One important step towards such progress is gradual strengthening of health-care systems, to enable delivery of effective primary health care with maternal, newborn, and child health at its core. Community-based action will also be needed, to enhance sustainability and ensure accountability.[8]

Key messages

- Maternal, newborn, and child health is at the centre of primary health care and cannot be effectively improved and sustained by vertical approaches
- District health teams need to plan for incremental additions to maternal, newborn, and child health, within primary health care and linked to referral units
- Private efforts should be integrated where possible
- Vulnerable groups should be prioritised at the district level
- Actions in health-related sectors (eg, social and legal protection, water and sanitation, and transport and communications) should be promoted
- Development of human resources needs to adhere to a comprehensive approach from training to practice, including shifting of tasks to ensure efficiency
- Care for mothers, newborn babies, and children should, in principle, be free for poor clients at the point of provision
- District health-management teams need support to strengthen their capacities to plan, cost, budget, implement, monitor, and evaluate interventions for maternal, newborn, and child health
- National governments should support district-level health care, through strategy, policies, training, and supervision
- Global initiatives need to identify a feasible agenda based on priorities that will support countries to improve outcomes in maternal, newborn, and child health

A review of the maternal and child health agenda from a health-systems perspective[9,10] has identified key packages of interventions that provide for a continuum of care for mothers, newborns babies, and children.[11] However, strategies for implementation of an integrated agenda for maternal, newborn, and child health at the district and community level has not been synthesised in the same way.[9] We review evidence on maternal, newborn, and child health, and assess the experiences of countries that have successfully integrated interventions to improve maternal and child health.

Integration of interventions can encompass addition of interventions at one point of service delivery (eg, integrated management of childhood illness, or use of an immunisation visit to promote and provide family-planning services); creation of links between different levels of service (such as community, primary, and referral levels), and coordination between the necessary activities that make up the delivery system, such as service delivery, logistics and supplies, and monitoring and assessment.[12] Therefore, such integration

applies not only to district-level health care but also to national strategies and global support (figure 1).

Despite advances in defining cost-effective interventions for maternal, newborn, and child health, a coherent agenda for the integration of maternal, newborn, and child health is recognised to be lacking. Reasons for the lack of progress include both historic factors and more recent global policy concerns (panel 1). Several of these factors operate at national and international levels. Therefore, although much of the actual work of planning and implementing an integrated agenda for maternal, newborn, and child health must take place at the district level, specific efforts to introduce change at the national and global levels will be pertinent. Therefore, we aim to address key policies, strategies, and financing issues for integrated interventions for maternal, newborn, and child health at the district and national levels, and to briefly comment on global issues. Earlier contributions have discussed the extent of the problem,[1,3] the existence of effective interventions,[2,14] and particular parts of the nexus for maternal, newborn, and child health.[1,3,7]

Substantial reforms and behavioural changes are needed both within the health sector and outside it.[5,6] For effective mobilisation of resources, rich countries need to move from rhetoric to action.[15,16] The current aid relationship is characterised by high transaction costs, inefficiencies, and a general lack of accountability.[17,18] One way to enhance commitments could be to allocate a defined share of development assistance in health to primary health care in general, and to maternal, newborn, and child health in particular. National governments have a role in allocation of public funds in an equitable manner, and in management and regulation of the health sector.[19] District health planners will need to adopt a systematic approach to the implementation of programmes that includes monitoring and evaluation, implementation research, and dissemination of results. Moreover, local communities should be involved in the design, implementation, and assessments of interventions to empower socially excluded people, including those from ethnic and other minorities.[8,20–22]

Experiences of success in some countries suggest the need to use incremental approaches to implement integrated packages for maternal, newborn, and child health, taking into account existing strengths and potentials at local levels, giving priority to disadvantaged groups, and exploiting potential synergies.[5,6,9,23] We provide an implementation framework intended as a guiding tool for assessment and systematic improvement of local health systems, and for intersectoral action. For target population groups to reap the potential benefits of integrated maternal, newborn, and child health, managers, decision makers, health-care providers, and stakeholders at district and national levels need to enact policies, act strategically, and implement financing mechanisms to support implementation of evidence-based interventions. The framework centres on: (i) availability of an integrated package of essential services for maternal, newborn, and child health (including outpatient services and associated socioeconomic interventions), and of referral mechanisms and institutional childbirth facilities; (ii) access for all pregnant women, newborns, and children, especially poor families; and (iii) affordability of these packages for poor households and resource strapped governments.

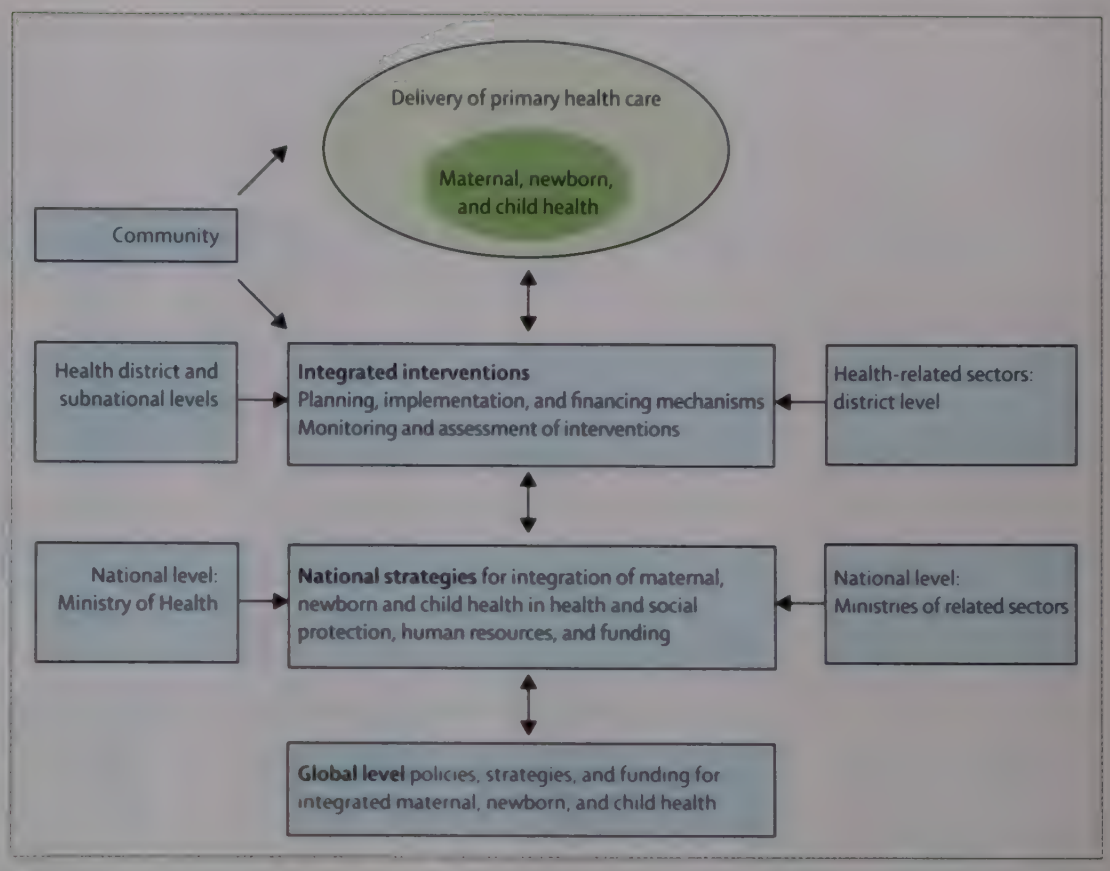
Delivery of primary health care
Maternal, newborn, and child health
Community
Health district and subnational levels
Integrated interventions
Planning, implementation, and financing mechanisms
Monitoring and assessment of interventions
Health-related sectors: district level
National level: Ministry of Health
National strategies for integration of maternal, newborn and child health in health and social protection, human resources, and funding
National level: Ministries of related sectors
Global level policies, strategies, and funding for integrated maternal, newborn, and child health

Figure 1: **Integrated care for both primary health and maternal, newborn, and child health at district level and supporting processes**

***Panel 1:* Barriers to effective implementation of integrated interventions**

- Weak health systems have been seen as unable to cope with integrated approaches, especially in primary health care
- Donors and governments have wanted evidence of success within short timeframes
- Other fields promise immediate results (eg, polio eradication, child immunisation, malaria eradication, or access to antiretroviral therapy)
- A history of charismatic leadership for single issues has been to the detriment of broader development of primary health-care systems
- Splits between clinical disciplines (eg, obstetrics and gynaecology *vs* paediatrics), organisations (maternal *vs* paediatric hospitals or primary-care facilities *vs* hospitals), and between clinical and public-health management structures have worked against integration
- Financial incentives in which poor countries accept international financial and technical support for specific interventions have been inefficient

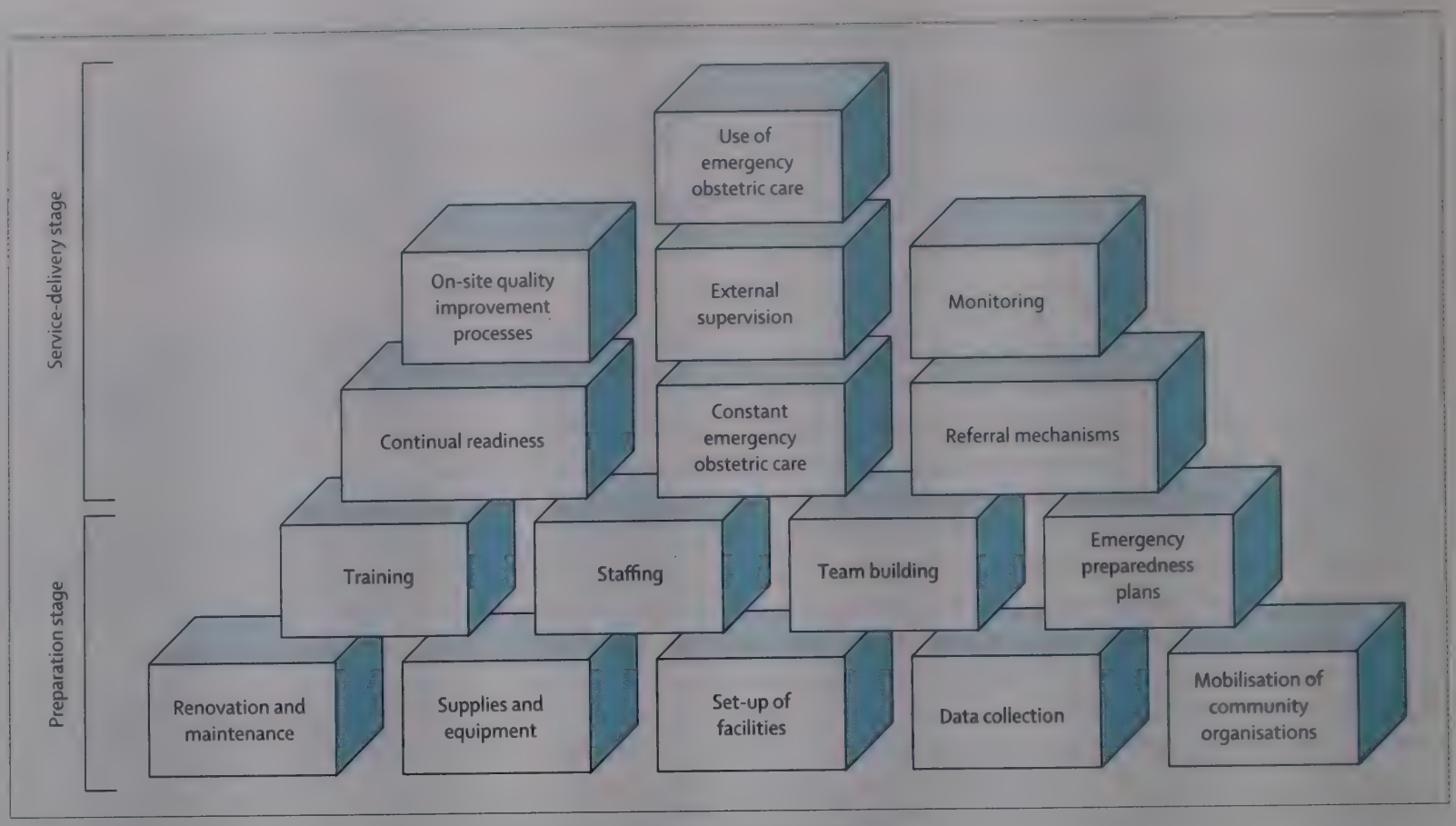

Figure 2: **Building blocks for maternal, newborn, and child health in emergency obstetric care**
Adapted from reference 9.

Integration at district level

In the context of maternal, newborn, and child health, a district refers to the smallest organisational entity with managerial responsibility, and some financial authority, to improve the health of the population within a defined geographic area. Effective packages of MNCH interventions and their delivery have been identified.[2] Better outcomes in maternal, newborn, and child health will depend on integration of the packages delivered at the community level, at primary-care facilities (health centres and outpatient departments), and district hospitals (first referral level), so that women and children benefit from a continuum of care.[11] But can health systems in districts with few resources and low management capacity achieve integrated management of maternal, newborn, and child health?[23–26] The managerial and financial capacity to plan and implement an integrated strategy for maternal, newborn, and child health varies greatly between countries and across districts within countries. Therefore, different districts need to prioritise different sets of interventions through local planning and follow-up; districts which have the capacity to do so can incrementally add new interventions and support expansion in weaker neighbouring districts.[6]

Strengthening health systems

Factors that limit the capacity for implementation of packages for maternal, newborn, and child health include inadequacy of human resources, irregular and inadequate supplies of drugs and materials because of weak logistical systems, delayed release of funds, and poor planning and

Panel 2: **Innovations to address financial barriers**

Background

- Maternal mortality ratio in Chiranjeevi Yojana, Gujarat, India was high and unchanging
- An integrated package of services for maternal, newborn, and child health was not available to the poorest people
- Public-health facilities had acute shortages of qualified health-care workers, particularly at the district level
- Three-quarters of gynaecologists worked in the private sector, and were not affordable for most women

Method

- A private–public partnership was introduced at the state level between district government and private providers in the five districts that had highest maternal mortality
- The scheme was aimed at women below the poverty line
- Private providers volunteered to join the initiative by signing a memorandum of understanding that identified a package of services to be delivered, including medicines, diet, and transportation
- Providers were reimbursed on a capitation basis, taking case-mix into consideration, and payments were made in advance or promptly
- Services were costed by rapid consultations with key informants
- Roles and responsibilities were clarified, by use of oversight, reviews, and monitoring
- Initiative was expanded to other districts after successful initial implementation

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Results

- More than 80% of poor women used the service during delivery
- Institutional deliveries increased in all districts, and caesarean rates remained less than 6%
- The maternal mortality rate was reduced from 290 deaths for every 100 000 delivered to only 18 deaths
- Members of the scheme made financial savings

Lessons

- Out-of-pocket spending was reduced, but remained necessary because of requirements for medicines
- In the absence of clear treatment protocols, it was difficult to assess whether medicines were clinically required
- Package of interventions should also have included postnatal care and newborn care
- The district-health authority was able to change its role from providing health services to purchasing essential health services for poor people
- Information and education about the availability of the package was essential
- Clarification of roles and accountability ensured sustainable success
- Scale-up of interventions was based on evidence and experience

management capacity.[10] In human resources, the most critical limitations are insufficient numbers and inadequate distribution of skilled birth attendants (for accessible 24 h delivery services) and of medical teams (for emergency obstetric care). These limitations need to be addressed, step-wise and systematically. A programme designed to improve emergency obstetric care (figure 2), Averting Maternal Disability and Death,[9] used these basic principles of systematic, incremental build-up of interventions.

Integrating district-level planning

Several structural and functional barriers to integrated management at the district level require attention. First, in many public sectors, hospitals and public health departments operate separately, in terms of budgets, operational targets, accountability, and reporting channels. Few incentives exist to coordinate activities across disciplines or between health centres and referral hospitals. The public sector and the private sector (for-profit and not-for-profit) often do not have effective channels of communication. Mutual distrust, rivalry, and perhaps suspicion between private and public providers are common—one way to counteract such developments is through joint district planning.[27]

Second, information on maternal, newborn, and child health that is collected through periodic sample surveys and continuous monitoring needs to provide district-specific information to identify groups that do not benefit from available health care, in parallel with the monitoring of service data to assess progress. Many countries depend on population-based surveys that

Policies	Strategies	Financing
Plan regularly for maternal, newborn, and child health, using synergies between sectors	Establish mechanisms for collaborative planning and monitoring of performance	Community financing options[30] Conditional Cash Transfers Community loan funds[31] Vouchers Community-based health insurance Exemption mechanisms
In health sector, agree on goals (eg, reduction in immunisation drop-outs, or reduced gap between antenatal care, skilled attendance and coverage of postnatal care) Define the respective roles and responsibilities of public, private, and not-for-profit groups in the health sector, and of communities, and primary-care and referral facilities	Reduce missed opportunities by combined delivery of interventions (eg, provision of family-planning advice at 6-week immunisation visits)[6,11] Adopt procedures to strengthen links (eg, in Malaysia, rural nurses visited mothers and newborn babies within 24 h of delivery by a traditional birth attendant or relative, and hospitals provided rural nurses with contact information for mothers and newborn babies at time of discharge from hospital) Supervise and provide support	
In related sectors, define specific health-related outcomes as goals	Choose measures to assess achievement of outcomes such as education and protection of women and girls; improvement of roads, transport, and communication; provision of water and sanitation; generation of income for women	
Monitor action towards health care in many sectors	Collect data to monitor activities	
Involve communities	Define strategies to involve community groups, including traditional birth attendants, traditional medicine practitioners, and community leaders	
Promote accountability	Assess and report achievements of key players (public and private organisations, including non-profit organisations) and their contributions to agreed targets Follow up budget and expenditure Involve communities, including as clients for health care.	

Figure 3: **District-level matrix of policies, strategies, and financing options**

***Panel 3*: Strengthening health systems in poor settings**

Background

- Sub-Saharan Africa has weak health systems
- The Tanzania Essential Health Interventions Project aimed to improve health outcomes by implementation of a minimum package of interventions by means of cost-effective changes to health systems and management
- The project attempted to address how to implement interventions at the district level

Method

- Efforts were based on local evidence about the burden of ill health obtained by systematic data collection
- Existing norms and dogma about health-care management and resource allocation had to be overcome
- Resources were controlled by local agents, rather than central offices
- The project used a set of tools for management of health accounts, service mapping (to ensure even distribution), community input and participation, and costing exercises

Results

- Child mortality rates were reduced by about 40% over 5 years
- Death rates in adolescents and adults were reduced by about 18%
- Transport and communications were improved both across and within districts

Lessons

- An integrated approach was needed to health care
- Health care was delivered in packages
- Implementation was combined with research on health systems
- Additional financial resources were needed, although these were not great
- Development of clinical and managerial skills was needed
- Investment in infrastructure was required
- Effective stewardship was essential to running of health systems
- Information was needed for effective and equitable allocation of interventions

***Panel 4*: Integration of maternal, newborn, and child health with primary health care**

Background

- Rural households in Iran were severely disadvantaged in income, political power, and health
- Inequities between health outcomes in rural and urban areas were large

Method

- Iranian primary health-care system was developed over two or three decades, from the mid-1970s
- Health houses were established in remote villages, and staffed with locally recruited health workers, or bhevarzan, of both sexes
- Each health house covered about 1500 people, including a village and its satellite villages, by design no more than 1 hour's walk away
- Staff did record keeping and data collection to create simple but well-integrated health-information systems
- Staff did public-health education and promotion of community participation; antenatal, perinatal, and postnatal care; care of children younger than 5 years and those of school age; family planning; immunisation; and disease-control services

Results

- Over the past 20 years, national disparities in health outcomes have been almost eliminated
- The rate of infant mortality in 1974 was 120 deaths per 1000 in rural populations, and 62 deaths in urban populations; by contrast, in 2000, infant mortality was 30 per 1000 in rural areas and 28 per 1000 in urban areas
- Political commitment for change was critical, together with institutional innovation, and the involvement of communities and local governments in decision making

Lessons

- Secondary and tertiary institutions still need to give full support to the health houses
- Urban areas are not yet coordinated
- Policies for collaboration with the private sector are not transparent, and mechanisms for quality improvement need to be strengthened

Adapted from reference 32.

provide only national or regional estimates that are insufficient for district-level management. Routine data collection for monitoring and evaluation is thus fundamental for incremental approaches.

Third, communication and interaction between the health and health-related sectors at district level, in joint planning and for monitoring and evaluation is a prerequisite for intersectoral synergies. For example, in Malaysia, district development committees provided such a forum and were held accountable for demonstrating progress.[6]

Fourth, capacity and managerial skills for planning, implementation, and financial management at the district level will need to be strengthened. Specific tasks include allocation of resources to geographic areas and implementation of non-traditional financing options, such as conditional cash transfers to improve access for individual poor women and children.[8,28]

Finally, health-sector reform and gradually increased managerial capacity at the district level should open new possibilities. Using the health-related Millennium Development Goals (MDGs 4 and 5) as a vehicle for change can enhance ways to deal with such district-level challenges. For example, in Bangladesh, to accelerate progress towards MDG 5, health-sector reform developed a strategy to increase demand for services through demand-side financing in the form of maternal health vouchers.[29] In one state of India, the role of the district health authorities transformed from that of a provider of delivery care to a purchaser of a package of services from the private sector (panel 2, Ramana GNV, World Bank, India, personal communication, 2008).

Planning and financing for integration

Groups at national and subnational (province or state) levels could usefully focus on supporting and improving

the scope for integrated planning for maternal, newborn, and child health at the district level, both within the health sector and across other related sectors (figure 3). Integrated planning would focus on selected intermediate outcomes, such as uptake of selected interventions in the population, and improved case management reflected in reduced case-fatality rates for key conditions. Early agreement on accountability measures for contribution would enhance progress towards the selected outcomes.

Agreement would need to be negotiated between district health officials, district hospital managers, major non-governmental organisations that provide related services, and doctors in charge of private hospitals and clinics (panel 2). If traditional practitioners, including birth attendants, are major providers, district health officials would need to identify and involve the more popular and influential practitioners.[8] The selected outcomes will depend on the socioeconomic characteristics, disease patterns, and health-system capacity of each district. An example of such integrated planning is the involvement of communities and infrastructure authorities in the selection of sites for new bridges across rivers in Nepal to enable access to emergency health care (Suvedi BK, Ministry of Health, Nepal, personal communication, 2008). Another instance is the urgent need to plan for integration of defined HIV-related activities into maternal, newborn, and child health in countries in Africa and Asia in which antiretroviral therapy now requires many resources. For example, in Ethiopia, the HIV/AIDS Department has been integrated into the Regional Health Bureau, which has enabled some staff with HIV/AIDS experience to assume responsibility for functions such as maternal health and child health. Counselling and screening for prevention of mother-to-child transmission of HIV are also being integrated in antenatal care sessions.[32]

Districts with relatively low capacity will need to focus on an integrated agenda around a few core intermediate outcomes for maternal, newborn, and child health, such as increased access to outreach and outpatient care for family planning, care for pregnant women and for children, and 24 h care for birthing and emergencies. Gaps and weaknesses will first need to be identified and addressed (eg, strengthening linkages between hospitals, health centres, and the community, including traditional birth attendants; introducing initiatives to ease the economic burden of childbirth for families);[33] and ensuring appropriate care for mothers and newborn babies. For example, in Malaysia, women who lived in areas with good road access to health facilities have been routinely advised to plan for institutional childbirth. In areas with poor access, the advice has been modified: those with pregnancy complications or very poor housing conditions have been advised to seek institutional childbirth, and others have been advised about how to prepare their own home for childbirth and to have transport plans for emergencies.[6] In Sri Lanka, maternity waiting homes have been established for women from remote areas to use for a few weeks before delivery; they have been very popular because of the good diet and opportunity to rest.[6]

Regular supervision to support health workers for the agreed interventions is an important but often neglected function of the district leadership team. Annual performance monitoring, and feedback should also involve communities and civil society in addition to harnessing the power of mass media to create incentives for improved performance of key players and for enhancing accountability. Experiences from Malaysia show for instance that publicity about maternal deaths by the Registrar of Births and Deaths was subsequently discussed in the Legislative Assembly and reported in the local press. Furthermore, complaints that staff at maternal, newborn, and child health clinics were not available during clinic hours have been published in local media. As a result, district and state (province) health directors investigated, resulting in disciplinary action and response from the Ministry of Health to the media. When a mother dies, health officials and specialists from the referral hospital have visited their village, met their family and village officials, to highlight the importance of prompt recognition and referral of women with delivery emergencies.

Introduction of initiatives to ease the economic burden for poor people involves complex decisions and fiscal responsibilities that usually go beyond the capacity of district-level managers. Financing mechanisms need to be feasible (ie, socially and culturally acceptable to the community), sustainable over the long term, and compatible with efficient and equitable service delivery. For example, exemptions from user fees are usually acceptable to communities, but are not always sustainable, manageable, or effective.[33] Recent evidence has suggested alternative strategies for financing health care.[34] Thus, policy decisions about financing of services need to be addressed at the national (or state) level.

***Panel 5:* District-level integrated planning**

- Involve public and private organisations, including not-for-profit organisations, in the health sector
- Involve representatives of both primary-care facilities and referral hospitals
- Focus on selected outcomes in maternal, newborn, and child health
- Plan and implement supportive supervision in care for maternal, newborn, and child health
- Plan with health-related sectors (to achieve synergies in selected poor areas, through improved water and sanitation, schooling, and communication)
- Establish accountability through agreed goals for key players
- Monitor progress and create incentives by involving communities, civil society, and mass media in reporting

Districts need to develop effective financing schemes that are adapted to the socioeconomic status of each population, the epidemiological situation, and the management capacity of the authorities. Options include conditional cash transfers and other money transfers, vouchers, exemptions targeted at poor and vulnerable people or the areas where they live, and various types of incentive-based payments through contracting arrangements (also for transportation and other contingencies).[30,34] The main objective is to make care for maternal and child health free of charge at the point of use,[30,35,36] which requires more than removal of formal user fees.[33,36,37] Although alternative means of financing can improve incentives to providers and individuals, they also require access to timely and high-quality data for monitoring.

The choice of financial approach will differ according to management capacity. If reasonably adequate planning and guidance are available at the district level, successful implementation is possible. For instance, in the Indian state of Gujarat, the private sector is able to provide high-quality services purchased by the public authorities (panel 2). Panel 3 shows an example of provision of effective primary health care, including for mothers and children in sub-Saharan Africa, which might be the most difficult context for health care.[23,38]

Sound national policies and effective implementation by a strong public sector can produce integrated efforts to provide primary health care in poor, peripheral areas, as has been proven in Iran (panel 4). Community-level interventions that focus on child health have been emphasised for several decades.[39] However, in maternal health, and also partly in newborn health, emergency care and skilled birth attendance have taken precedence over community-level interventions.[11] Community-based interventions can contribute to improvement of maternal and newborn health.[8] Such initiatives also need to be incremental and build on district linkages with population groups (panel 5).

In Malaysia and Sri Lanka, maternal and newborn mortality have been rapidly reduced since the 1950s, by a stepwise approach that has targeted especially underprivileged groups. In both countries, multisectoral strategies have combined improvements in maternal health care with efforts to improve water and sanitation, communication, and schooling, especially for girls. Public expenditure was surprisingly small, at about a quarter of the total health-care expenditure, which amounted to only around 1·5% of gross national product in Malaysia and in Sri Lanka (panel 6). In China, both maternal and child health improved rapidly during the 1970s and 1980s, thanks to an area-based primary health-care approach that used basic health workers (so-called barefoot doctors), and systematically addressed barriers to emergency care (panel 7).

The experiences of Sri Lanka, Malaysia, China between 1950 and 1980, and of Iran over the past few decades show that mortality and morbidity in mothers, babies, and children can be reduced by sustained, incremental, and integrated efforts within gradually expanded and strengthened health systems. Local communities in all four countries have been involved in the development of these improvements, which enhanced local accountability. One common characteristic of health-care systems that manage to sustain improvements in clinical quality processes over time has been client consultations (eg, regular exit interviews or anonymous questionnaires about satisfaction).[6,40]

***Panel 6:* Integration of maternal, newborn, and child health with primary health care in Malaysia and Sri Lanka**

Background

- 50–60 years ago, Malaysia and Sri Lanka had predominantly rural populations, with high rates of maternal and infant mortality and malaria, and poor sanitation
- Physical access to health care was poor; literacy was relatively low; economies were weak but growing
- Newly acquired independence provided strong impetus for rural development

Method

- Primary health care was integrated with rural development, including education, rural roads and transport, and sanitation
- Primary health care was built with care for maternal, newborn, and child health, control of malaria and communicable diseases, and sanitation and water supplies
- Maternal, newborn, and child health care was provided by publicly funded rural midwives and public-health nurses, including 24-h birthing care
- Partnerships with community leaders and traditional birth attendants were established
- Midwives and nurses gained the trust of communities by their clinical competence
- A step-wise approach initially made contact with families to provide child health, and then offered care during pregnancy and childbirth, with prompt referral to institutions when necessary
- An incremental approach was used initially in districts and periurban areas that had stronger health systems, followed by systematic expansion to weaker districts, and underserved areas

Result

- Rural–urban and ethnic inequities in health outcomes, including maternal and child mortality, were reduced
- Maternal mortality rates have been halved every 7–12 years in both countries
- Midwives and public-health nurses remain the backbone of the rural health systems of both countries

Lessons

- Initial reliance on midwives, supervised by public-health nurses rather than physicians, enabled the development of affordable primary health-care systems
- Primary health-care development involved an initial focus on reaching out, followed progressively by emphasis on quality of care, strengthened management capacity at district level, close links between rural health staff and hospitals, and later development of more highly skilled categories of personnel for primary health care
- Primary health-care systems have evolved dynamically and remained relevant and effective as mortality declined and the challenges of maternal, newborn, and child health became more complex
- Primary health care can be sustainable, if embedded within broader development (such as education, water and sanitation, roads and transport)

Adapted from references 5 and 6.

Fundamental to planning and implementation is the gradual strengthening and support of the district-level team, in management, planning, and fiduciary capacity. Necessary capacity also includes provision of supplies and essential drugs, and human-resource management.

National actions to promote integrated maternal, newborn, and child health

Initial support at the national level can help to create local momentum and to sustain integrative approaches to maternal, newborn, and child health. The central or provincial governing bodies and institutions of a country, or the state can develop policies, legislation, and strategies to be implemented at lower levels, and regulate the national health sector. Provision of tertiary services and human-resource development are usually national actions. National initiatives in related sectors—social protection, communication and transport, and water and sanitation—are also important (figure 1).

Policy makers and senior managers in ministries of health and in federal agencies, such as those for public health, social health insurance, and national health boards have the principal responsibility for maternal, newborn, and child health. More distal actors at the national level include policy makers and senior managers at other government ministries (notably finance, planning and development, education, justice, social affairs, infrastructure, and communication).[41] Other key actors at the national level are civic and non-governmental organisations, human rights organisations, and women's empowerment organisations.[21] National health institutes and universities or teaching institutions often contribute to policy making and agenda setting. Figure 4 outlines the main strategic areas in which support at the national level is crucial to district actions.

The central policy tool at this level is a national health strategy—a high-level document which sets out the government's broader policies for health-sector development. Maternal, newborn, and child health should feature prominently in such a document, in terms of both its place in health-sector development and its budgetary allocation.

The fact that mothers, newborn babies, and children in poor and socially excluded groups have especially poor health suggests that national health strategies need to adopt equity as a core principle.[17] Reduction of health inequalities will require improvements in access to care for those who are worst off. Improved outcomes for such people will require a broader approach to maternal, newborn, and child health across sectors including education, women's empowerment, legal and social protection, water and sanitation, transport, and communication. Regarding legal and social protection, ministries of health should collaborate with other departments and agencies to promote gender equity and freedom from violence, abuse, and coercion. For example, in countries where child marriage contributes to maternal deaths, fistulae, early divorce, urban migration and sexually transmitted infections, it must be addressed since it threatens both child and maternal health.[42] Furthermore, national health strategies need to adopt policies that focus on developing and strengthening health systems and their ability to provide maternal, newborn, and child health.[17]

Countries need to adopt strategies that address constraints both within and outside health systems to improve the health of mothers and children. Within the health system, maternal, newborn, and child health must be seen as key to development of primary health care. Other programmes with partial focus in maternal, newborn, and child health (malaria, sexually transmitted infections, tuberculosis, nutrition, immunisation, family planning, and abortion care) need to tie in to this, not acting through vertical approaches. Ministries of health are also responsible for collection of national data, to fuel action by showing progress and identifying vulnerable groups.[9,11] Operational research, which is designed to

Panel 7: **Integration of maternal, newborn, and child health with primary health care in China**

Background

- The maternal mortality rate in China was reduced from about 1500 deaths per 100 000 women of reproductive age in 1949, to 100 in 1980 and to 61 in 1996
- National policies needed to be translated to provincial and district levels

Method

- Pursuant to a national policy, governors had to publicly provide information on reduction of maternal mortality
- Governors held officers in provinces, counties, and townships accountable for local mortality rates
- The strategy in Yunnan province aimed to increase numbers of childbirths in hospitals and establish referral systems from the barefoot village doctors to hospitals
- An insurance scheme and performance-based contracts were put in place
- Defined indicators of maternal, newborn, and child health determined subsidies for facilities and continued employment of lower level staff

Results

- More pregnant women at risk were screened
- Maternal mortality was reduced from 149 per 100 000 livebirths in 1989 to 101 in 1998
- Total fertility rates dropped from 5·25 in the 1970s to 2·2 in 1998

Lessons

National and subnational levels can provide strong incentives for district and local initiatives through financial and monitoring mechanisms

Adapted from references 5 and 6.

Policies	Strategies	Financing
Make equity the core of development policies and strategies for poverty reduction Use health financing strategies	A basic integrated health-care package must be available to all people, or at least to poor people, for free	National health service Social health insurance Voluntary health insurance Development assistance in health
Provide social and legal protection for women and children	Provide primary schooling, including for girls; protection against sexual and other physical abuse; child rights; minimum age at marriage. Enable generation of income and reduction of poverty	
Develop health systems	Define packages of interventions for essential health care Develop human resources Regulate health systems Establish monitoring systems Do operational research	Performance-based remuneration
Create a national health strategy and development plan	Integrate care for maternal, newborn, and child health with priority disease programmes for malaria, sexually transmitted infections, tuberculosis, nutrition, and programmes for immunisation Ensure cultural and social acceptability of maternal, newborn, and child health	
Provide health care for vulnerable groups	Consider the specific needs of teenagers, women with unwanted pregnancies (abortion care),minorities, refugees, migrants, and people living with HIV/AIDS	Exemption schemes Direct or targeted subsidies
Promote accountability	Ensure political pressure on governments (from individuals, non-governmental organisations, health-care professionals. multilateral organisations, parliament, and media) to prioritise and pursue policies that benefit the general public Follow up implementation of district and regional plans Strong leadership from Ministry of Health, to mobilise support from other departments, with inclusive planning processes	

Figure 4: **Integration of maternal, newborn, and child health at the national level**

assess implementation of programmes, is an extension of this specific data gathering and analysis work by ministries.[43] Some governments have made serious efforts to meet MDGs 4 and 5 by adopting sound policies and national plans, whereas others are lagging.[10]

In parallel with reform of health sectors and devolution of responsibility to communities, governments need to shift effort from micromanagement of the health system to effective regulation and oversight. The most challenging task in many low-income countries is development of human resources, including strengthening of the capacity of nurses and midwives.[5,42] Ministries of health can also ensure that appropriate, evidence-based protocols and procedures are selected and promoted in training and implementation at all levels. Too often, academic institutions emphasise advanced technologies or procedures that are not appropriate, and fail to train their students in how to provide care in resource-constrained situations. This can stifle delivery of primary health care. Teaching of community-oriented, cost-effective approaches in the initial and continuing education of health professionals will be necessary to ensure that strengthened primary health care does not have limited and slow effects on maternal, newborn, and child health.

Ministries of health have special responsibilities to follow new developments—not only health-care interventions, but also community involvement, data-collection methods and information technologies—that could facilitate maternal, newborn, and child health. For example, in Tamil Nadu in India, hand-held computers have been introduced to improve action-oriented data collection in rural areas, and in Andra Pradesh, ambulance services have been linked to an efficient call-centre operation that can answer 95% of calls within two rings from any mobile or land-based phone. Initially a public–private partnership, this initiative has expanded throughout the state. About 4000 lives have been saved by this initiative (Ramana GNV, World Bank, India, personal communication, 2008).

Governments have a responsibility to mobilise resources for maternal, newborn, and child health; allocate these resources in an equitable way across regions and population groups;[45] purchase services; and pay providers. No particular model of health financing at the national level—eg, general taxes or social insurance—has been shown to be most effective.[46] Instead, countries need to adapt the most effective system for their national circumstances.[47,48] An appropriate set of cost-effective interventions for maternal, newborn, and child health

must be included in the benefits package.[49] In resource-poor settings, the approach should be to incrementally enlarge this set of interventions as the financial envelope expands.

Global integration of initiatives for maternal, newborn, and child health

Successful implementation of an integrated agenda for maternal, newborn, and child health will depend on the constructive support at the global level for countries and districts. Global development partners, including bilateral and multilateral agencies, governmental and non-governmental organisations, research institutions, and international partnerships can all assist countries to achieve MDGs 4 and 5. Global partners can provide technical and strategic policy guidance, support global public goods for maternal, newborn, and child health, ensure a favourable global structure of governance and policies, and make financial resources available. Research agencies in rich countries should implement many programmes and collect and disseminate any evidence of their effects.

For countries with severe financial constraints, a vast share of the necessary resources will need to come in the form of development assistance for health.[50–53] The share of aid for maternal, newborn, and child health as a proportion of total development assistance in health will also need to increase.[50] Partners could perhaps commit a certain amount of financial aid to primary health care and to and maternal and child health care.

Relevant global initiatives and processes include a Global Business Plan for Maternal Newborn, and Child Health, the Paris Declaration on Aid Effectiveness, the Partnership for Maternal Newborn, and Child Health, and the Countdown to 2015 initiative. A general agreement on the set of priorities and actions for effective implementation of the integrated agenda for maternal, newborn, and child health will assist these global policy initiatives and institutions to provide a mutually consistent and coherent policy environment.

Most donor assistance is today still delivered through specific projects and only 5% has been dedicated to general budget support and health sector support in recipient countries.[54] Countries with weak health systems are most dependent on donor assistance. But the existence of multiple financial inputs to district-level health systems, which are associated with separate requests for reports on specific interventions throughout the year, distract from planning and implementation of an integrated programme. The need to integrate financial aid from different donors is recognised in the Paris Declaration on Aid Effectiveness,[55] which includes core principles of harmonisation of aid, namely simplifying procedures, making common arrangements, and sharing information. Barriers to the implementation of such integrated approaches need to be recognised and addressed.

Conclusions

To develop an integrated agenda for maternal, newborn, and child health, incremental and synergistic actions are needed at the district, national, and global levels. Policies, strategies, and financing of maternal, newborn, and child health need to accompany interventions at the national and district levels. All countries mentioned have systematically facilitated actions outside the health system by national strategies, and implemented them intersectorally in health districts over many years, albeit in different ways and to varying degrees over time.

Accountability is a driving force, and central to the advancement of sustainable improvements in health service delivery.[56] Gradual, positive development requires governing bodies at national and district levels that are concerned with the welfare of their constituencies and that are not too corrupt—and the absence of violence and conflict. Accountability can take financial, performance, and political or democratic forms,[57] which have different weights at the district and national levels. The attention of decision makers must be harnessed through awareness of national and local data, through the work of non-governmental organisations, professional organisations, and consumer groups such as women's organisations. Decision makers must also be held socially and politically accountable.[58]

Contributors

All authors have participated in the writing of this manuscript, and have seen and approved the final version.

Conflict of interest statement

We declare that we have no conflict of interest.

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Alma-Ata: Rebirth and Revision 8

Primary health care: making Alma-Ata a reality

*John Walley, Joy E Lawn, Anne Tinker, Andres de Francisco, Mickey Chopra, Igor Rudan, Zulfiqar A Bhutta, Robert E Black, and the Lancet Alma-Ata Working Group**

The principles agreed at Alma-Ata 30 years ago apply just as much now as they did then. "Health for all" by the year 2000 was not achieved, and the Millennium Development Goals (MDGs) for 2015 will not be met in most low-income countries without substantial acceleration of primary health care. Factors have included insufficient political prioritisation of health, structural adjustment policies, poor governance, population growth, inadequate health systems, and scarce research and assessment on primary health care. We propose the following priorities for revitalising primary health care. Health-service infrastructure, including human resources and essential drugs, needs strengthening, and user fees should be removed for primary health-care services to improve use. A continuum of care for maternal, newborn, and child health services, including family planning, is needed. Evidence-based, integrated packages of community and primary curative and preventive care should be adapted to country contexts, assessed, and scaled up. Community participation and community health workers linked to strengthened primary-care facilities and first-referral services are needed. Furthermore, intersectoral action linking health and development is necessary, including that for better water, sanitation, nutrition, food security, and HIV control. Chronic diseases, mental health, and child development should be addressed. Progress should be measured and accountability assured. We prioritise research questions and suggest actions and measures for stakeholders both locally and globally, which are required to revitalise primary health care.

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See **Editorial** page 863

This is the eighth in a **Series** of eight papers about Alma-Ata: rebirth and revision

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Revisiting Alma-Ata

30 years after the Alma-Ata Declaration for primary health care, "health for all"[1] remains a long way off for many countries, even those that are on track for mortality reduction goals, yet it remains the ultimate vision. The Millennium Development Goals (MDGs), which were adopted in 2000 as the next generation of the "health for all goals", specify eight aims and measurable targets, including reduction in maternal and child mortality and in the burden of HIV, malaria, and tuberculosis, and associated development targets for education and gender equity.[2] These goals have been accepted by the widest constituency of any set of health and development goals in history. The health targets correctly aim at reducing deaths as the first priority, yet reducing non-fatal diseases and improving quality of life are also important.

Primary health care is an approach to achieve both the MDGs and the wider goal of universal access to health through acceptable, accessible, appropriate, and affordable health care. Thus primary health care, if implemented, would advance health equity in all countries rich and poor and, as a result, promote human and national development.[3] Effective primary health care strengthens the integration of community, primary, and district health-care and prevention services.[4] Health depends on more than the health-care sector alone, and primary health care has from the beginning stressed the importance of intersectoral collaboration, social justice with community participation, and empowerment. Finally, the broad range of preventive and curative services provided within primary health care makes it a particularly cost-effective approach to address the large population health challenges in low-income and middle-income countries.

In retrospect, one concern with the primary health-care approach was the scarcity of a proposed strategy for implementation and its monitoring for accountability and scale-up purposes.[3] Furthermore, the ideals adopted in Alma-Ata and the energy created by the declaration lost their initial power in arguments between comprehensive or selective approaches. This tension is now being resolved in many countries by integration of vertical approaches (programmes for priority diseases) with horizontal approaches (to strengthen services for all health problems), thus developing integrated primary health-care services in a phased or step-wise manner. Recognition of the need to train and retain competent staff is also leading to more effective implementation.[5]

The variability of progress in the primary health-care approach, and the move towards integration, are well shown in the area of maternal, newborn, and child health.[3] Substantial progress is being made for child survival, whereas maternal and newborn health have been comparatively neglected until recently. The emphasis has shifted to provision of a continuum of care—including skilled attendance at birth for mothers and neonates and strengthening early postnatal care—as well as maternal, newborn, and child health, but most countries with high burden of disease still have very low coverage of such services.[3,6] Access to family planning, previously a priority, has fallen off the global priority list, despite it being one of the most cost-effective interventions for maternal, newborn, and child health.[7] Newer disease burdens, such as chronic diseases[8] and mental health,[9] are becoming more apparent. Hunger is an enduring threat, and an unacceptably high proportion of children and mothers remain undernourished, mainly in south

Asia and Africa.[10] Integration of nutrition services within primary health care and improved links to other relevant non-health sectors remain as important now as they were 30 years ago.

Over the past decade, assistance agencies have substantially increased funding through global funds to address specific diseases, particularly HIV/AIDS, tuberculosis, and malaria. Even for these diseases much still remains to be done—eg, coverage for HIV prevention interventions is only around 20%.[11] The challenge is to implement an achievable but comprehensive integrated approach to primary health care together with phased, long-term health-system building.[3]

Where are we now, and what are the gaps?

Despite the ideals and enthusiasm after Alma-Ata, primary health care continues to be inadequately supported and resourced.[12] The coverage and quality of services in some countries has deteriorated because of conflict, poor governance, structural adjustment, population growth, and disinvestment in health.[13,14]

There are notable exceptions, as shown by the 30 low-income countries that have made steady progress to reduce deaths in children younger than 5 years and, in some cases, also newborn and maternal deaths.[15] For instance, Thailand, with a gross per-head income less than US$3000 a year, has achieved remarkable progress and is at the top of the list of 30 low-income countries making rapid progress for child mortality reduction and equity in facility-based maternal-health services.[15] Success in progress towards health goals is affected by a country's political and social commitment to health and development. When stability, good governance, and stewardship for primary health care and other health services has been exhibited, progress is obvious.[15] However, even in countries with major challenges, a sustained political commitment makes a difference. In Malawi, for example, primary health-care services have been maintained despite the additional burden from HIV/AIDS. Sri Lanka and Haiti provide good examples of successful sociopolitical commitment despite political instability. In Haiti, this commitment has largely been through non-governmental and faith-based organisations.[15] Progress is possible with a willingness to innovate—eg, with different types of partners and health workers used to access hard to reach populations.

Community care, empowerment, and active social participation in improvement of health services might be the most neglected part of Alma-Ata.[3,16] Chronic diseases and mental-health disorders are emerging health problems. Key aspects of primary health-care services that need to be strengthened include district health-management systems with local use of data for decision making and coherent use of community health workers and other primary health-care personnel. The reality of intersectoral linkage between health and development is variable, with some countries achieving great progress in education, water and sanitation, and nutrition, and others not progressing and continuing to dichotomise development and health.[15]

Despite the challenges and restrictions in implementation so far, the ideals expressed at Alma-Ata and the primary health-care approach are as valid now as ever. We also now have evidence for a much greater range of cost-effective interventions than we did 30 years ago.[17] Unlike at Alma-Ata, specific health targets have now been set for 2015 and progress is being monitored. However, only 7 years remain in which to achieve the MDGs. Should we be considering a further set of goals for an extended timeframe, such as over the coming 20 years, which would go beyond mortality reduction and help to sustain action for health after 2015? If so, now is the time to start, since such goals would take time to develop as measurable targets owned by countries and the global health community.

Revitalisation of primary health care at scale

All levels—individual, family, community, facility, district, provincial, national, and global—have a role and responsibility if health for all is to be achieved. To deliver results with a primary health-care approach will need partnerships, links, and an enabling environment including bottom-up support from empowered communities, top-down support from responsible governments and across municipal and state levels, and external support with technical and financial resources, when needed and appropriate.[5,18] Primary-care services and facilities need to be strengthened and linked to the communities that they serve. But primary health care is wider than the health system, and needs greater action. The emphasis on community participation and intersectoral collaboration given by the Alma-Ata Declaration is even more relevant now with increasing complexity of the development architecture. We need pragmatic and measurable approaches that build evidence on how these strategies can best be implemented in various settings. The table outlines some priority actions that can be taken and their measurement at each level. The seven priorities for revitalisation of the Alma-Ata commitment to a primary health-care approach are described below.

(1) Making and keeping health and health equity a priority

Although mortality is an important indicator, the vision that health is a state of wellness, not solely an absence of death or disease, should not be lost.[19] The MDGs, which have measurable outcomes and build on health and development for all, will continue to be valid and relevant for many countries beyond 2015 and need to be held as a benchmark of success. However, measurable targets are also needed to extend beyond the MDGs' target date of 2015 and cover the broader health agenda as envisioned in Alma-Ata.

(2) Implementation of integrated primary health care at scale

When unified national health plans, including those for maternal, newborn, and child health and wider components of primary health care do not exist, investments of time, expertise, and funds are urgently needed to put them into place. Even more important than national strategic plans are specific implementation planning processes, leading to district action. National to district planning and management systems need to be systematic, and human and material resources strengthened.[5] Good governance has to be fostered and, where it exists, an increased proportion of donor funds should be channelled through budget support and sector-wide approaches, while partnerships with civil society are strengthened. Public, non-governmental, faith-based, and private providers need to be linked into a coherent health system under responsible government stewardship. Countries with such frameworks in place are overperforming for health outcomes despite major challenges—eg, Malawi has an essential health package and a national agreement with Christian Health Association of Malawi, which provides 40% of health-care services.[15]

Selection of a set of key evidence-based interventions for implementation in primary health-care settings is crucial.[4] Packages of care for maternal, newborn, and child health can be expanded to include interventions that address mental health, child development, and other long-term outcomes.[6] An integrated approach to the management of chronic disorders, irrespective of the cause, is not only feasible but desirable within primary health care.[8] Experience and evidence from successes of this approach need to be applied to other disease groups. For example, the systematic package for tuberculosis care has been successfully adapted to deliver HIV antiretroviral services within the general health services of Malawi.[20] This approach could be applied to other chronic diseases such as diabetes, epilepsy, and mental illness, and to a continuum of care approach to maternal, newborn, and child health at a district level. All innovations should be designed so as to be replicable and sustainable with available or realistically attainable human and material resources. Assessment embedded within early district implementation can be the basis for refining guidelines and other methods for implementation to ensure effective scale-up nationally and to learn from what works and why, or why not.[21]

When health systems are weak or the timeframe is short, interventions have been implemented vertically. This approach can be either to achieve important benefits at scale in as short a time as possible—eg, since 2000 for HIV antiretroviral services—or because donors are

	Action: implementation of PHC at scale	Measurement: measuring markers, progress, and accountability
Community, family, individuals	• Select and support CHWs • Actively participate in community health-promotion activities and development programmes (income generation, water and sanitation, self-reliance)	• Funding, training, and supervision for CHWs that is established and tracked, including attrition rates • Community mobilisation for health promotion and poverty eradication programmes which are established and have trackable indicators
Health centres, hospitals, practitioners	• Train, supervise, and use packages of care, guidelines, and management methods—eg, IMCI, IMAI, IMPAC • Provide outreach activities and links with CHWs and private sector to improve coverage of interventions and strengthen referral • Support community health promotion	• Health facility capability to provide services that are assessed regularly • Regular assessment of client satisfaction in place with use of available methods to measure quality • Effective functional plans to register and link public and private providers
District, subdistrict	• Plan and budget according to disease burden and related cost-effective packages of care and prevention • Build CHW, MNCH, and FP delivery, and strengthen referral strategies • Ensure equitable distribution and quality of health workers	• District level methods used for planning, linking burden with budget allocation, procurement, and management • District plan in place to integrate MNCH and FP interventions at community, health centre, hospital levels, and referral system • Track health worker knowledge, skills, performance, and the rate that they leave their place of work
National, state, or provincial	• Integrate health sector plans and use of methods for planning • Scale up proven health systems approaches on the basis of evidence • Coordinate funding with agriculture, food security, climate change, and population policies • Introduce phased removal of user fees for PHC services, at least for vulnerable populations and poor people	• One national health plan and national legislation for health promotion and sex equality in place • Documentation of content and process for programme priority setting to develop and refine integrated high-impact interventions adapted to context on the basis of local epidemiology and evidence • One national monitoring plan including coverage and quality of key interventions assessed, and disaggregated by equity, sex, or ethnic origin • One national general budget with a section with health allocations specified • User fees removed for PHC (or at least exemptions for MNCH and vulnerable populations)
Global	• Prioritise funding by burden of disease, cost-effective interventions, and health systems building over time • Provide predictable long-term financing for health • Provide budget support for sector-wide approaches in countries with good governance and where equity goals are pursued • Increase investment in implementation research for PHC and building local research capacity	• Coordination of development partners and national funds for health in accordance with the Paris Declaration (OECD tracking) • Unified or harmonised assessment frameworks available for MNCH and PHC, with funds allocated for continued assessment at scale • Methods for programme priority setting for programmes on the basis of peer-reviewed effectiveness and cost inputs, and which are user friendly for country use • Research funding on the basis of transparent priority setting methods

PHC=primary health care. CHW=community health worker. IMCI= Integrated Management of Childhood Illness. IMAI=Integrated Management of Adolescent and Adult Illness. IMPAC=Integrated Management of Pregnancy and Childbirth. MNCH=maternal, newborn, and child health. FP=family planning. OECD=Organization for Economic Co-operation and Development.

Table: **Implementation and measurement of primary health care at scale by level of responsibility**

focused on short-term goals. However, even if the start is vertical, over time interventions should be integrated and delivered by coordinated cadres of multipurpose and more specialised health workers within district management systems and with participation from communities.[3,5,15] As new evidence for an intervention becomes available, the feasibility and effectiveness of adding the intervention to primary health-care services should be assessed locally.[4] Some leading advocates of primary health care have suggested that 15% of all funds from vertical interventions should be invested in comprehensive primary health-care systems.[12]

To achieve quality and safety in primary health-care services, sufficient numbers of appropriately trained and supported health workers are needed. Properly supervised task shifting is required, as proposed by WHO in the context of HIV care.[22] Although evidence for task shifting from doctors to nurse practitioners and from health professionals to lay health workers does exist, the evidence base needs to be strengthened.[23] Pakistan provides an example of an effective national programme for community health workers.[24] There is a real danger of overloading health workers with too many tasks, hence careful and systematic tailoring of tasks to local health needs and available resources will be necessary.[3] Effective and supportive supervision is key to improvement of service delivery, and educational outreach visits have improved prescribing.[23]

The quality of care rests on the use of high-quality guidelines. Essential care and prevention packages have been developed for the major health disorders affecting children; for maternal, newborn, and child health; and for adults.[23] These packages include the integrated management of childhood illness; an essential practice guide for pregnancy, childbirth, post-partum, and newborn care;[25] and the integrated management of adolescent and adult illness,[26] which already includes chronic HIV and antiretroviral treatment guidelines, but diabetes and other chronic diseases could be added.[8] These technical interventions need to be designed in the broader context of primary health care and community development, including education, nutrition, water, and sanitation. Together with access to basic primary health care and prevention measures, essential drug lists and formularies remain important in implementation of primary health-care services.

(3) Ensuring equity and sex equality

Since the burden of disease is greatest for the poorest people, we must consider their needs first. Evidence shows that use of services by poor people is improved when user fees are reduced or withdrawn, providing that the resources are replaced,[23] or if incentives for care are provided through conditional cash transfers.[27] Services should specifically target and reach deprived rural and urban areas, with particular attention to women, children, and other disadvantaged and vulnerable groups (eg, indigenous people, inmates, elderly people, people with disabilities, refugees, and internally displaced populations). For example, working directly with women's groups can help address sex inequities and increase cultural acceptance and sustainability, while indirectly benefiting other family and community members. Community health workers can reach and serve populations that have limited access to facility care.[28]

(4) Facilitating community participation and empowerment

Active community participation is essential for effective community interventions such as those for maternal, newborn, and child health and environment-related diseases.[16] Community participation is not merely mobilising people to accept a health intervention.[29] Experience has shown the need for a shift from health education (provision of information) to health promotion (transformation of attitudes and behaviour) to empower people to have a more active role in their health.[30,31] Health promotion messages are not static—the epidemiological transition and a rise in chronic, non-communicable diseases related to ageing populations, changing diets, tobacco use, and more sedentary lifestyles will need appropriate messages and dissemination. Through education in schools and health promotion, communities can take control over their health.

One trial has shown that mobilisation of women and other community-based groups in Nepalese villages can lead to decreases in newborn and probably maternal mortality.[32] The challenge for the community mobilisation approach is to effectively replicate it at scale. Previously, the emphasis on community participation has been focused on poor people in rural areas. However, since a majority of the world's population now live in cities, the need is for community engagement for poor people living in urban areas and requires functional models of care. For example, the BRAC (formerly the Bangladesh Rural Advancement Committee) programme in Bangladesh delivers maternal and child health and family planning interventions in urban areas with good results.[33] Participatory research should be embedded within implementation projects, as with the tuberculosis public–private doctors' partnership in Nepal.[34]

(5) Linking health and development

Health professionals can easily overlook that health is affected by much more than health services, and conversely the development community can view health as a separate entity.[3] Both the Alma-Ata declaration and the MDGs have helped broaden this view by emphasising the importance of intersectoral approaches to poverty reduction and development. In practice, intersectoral collaboration is difficult to achieve since sectors tend to operate in isolation—eg, persuasion of the health and agricultural sectors to prioritise nutrition and food security is difficult, yet this need is greater than ever. That investment in

education, especially of girls, greatly affects health is well known. The WHO Commission on Social Determinants for Health recommends that countries address and monitor the inequitable distribution of resources, living and working conditions, and child development.[35] They should provide universal health-care coverage on the basis of the primary health-care model with "locally appropriate action for prevention and promotion in balance with investment in curative interventions, and an emphasis on the primary level of care".[35] It recommends ending user fees and financing the health-care system through general taxation or mandatory universal insurance. Generally, although intersectoral collaboration is difficult to measure, such evidence (or at least more assessment of experiences at scale in countries) will be crucial for the development of sound strategies to affect the health of this generation and the next.

(6) Measurement of change and ensuring accountability

Statements such as "health for all" are inspirational, yet difficult to measure. Effective tracking of primary health-care implementation needs definite outcome and process measures, including mortality measurement and measures of coverage of high-impact interventions, health systems functioning, and community action. A key challenge for primary health-care implementation is that of monitoring progress towards clearly defined and realistic targets. Such monitoring needs process indicators, including those reflecting health-system performance (human resources and management, infrastructure and maintenance, regulatory procedures, transparency and democratic governance arrangements, levels of sustained financing, budgeting, and planning). Measurement of equity is key to assessment of progress towards the MDGs and primary health care, particularly the way in which we are reaching people who are underserved. This approach should include monitoring process measures, such as vulnerable populations' access to services, service coverage, and health-care practices.

(7) Investment in innovation for drugs and technologies, and in implementation research

The early days after Alma-Ata resulted in innovation for drugs and technologies (such as oral rehydration solution), which was driven by need and feasibility in low-resource settings. Essential drugs policies advanced the use of appropriate and low-cost generic drugs. However, innovation for health technologies for poor people has again fallen off the global agenda, apart from some encouraging signs in specific initiatives: better medicines for children and affordable medicines for all, and drugs for neglected diseases. Strategic prioritisation for new drugs and technologies and effective partnerships are needed to address the gaps and make sure that the solutions reach poor people, as has been achieved very effectively for pneumococcal vaccines through the accelerated development and introduction plan.[3]

***Panel 1:* Research priorities for primary health care based on systematic scoring of research options**

Overall PHC research priorities

- Assessment of substitution of nurse and professional tasks by lay workers (eg, CHWs, pharmacy assistants, etc)
- Cost-effective approaches to mapping PHC services against need
- Cost-effective monitoring systems to check coverage of PHC for marginalised populations
- Cost-effectiveness of substituting physician tasks with skilled nurses
- Assessment of different outreach models for essential PHC interventions

Research priorities for maternal, newborn, and child health in PHC

- Cost-effectiveness of various approaches to providing early postnatal and newborn care
- Cost-effectiveness of different service delivery models for integrated MNCH services
- Cost-effectiveness of supportive supervision and other linkage initiatives to make peripheral MNCH units and health centres interact effectively with referral units
- Comparisons of different models of scaled up community IMCI
- Assessment of methods to monitor child and maternal mortality on a yearly basis

Priorities for chronic disease research in primary health care are listed in reference 8. PHC=primary health care. CHW=community health workers. MNCH=maternal, newborn, and child health. IMCI=Integrated Management of Childhood Illness. See webappendix for the full list of research questions considered.

Research and innovation are needed to improve health status, and the interaction between researchers, policy makers, and other stakeholders is essential to design, undertake, and use the results of research.[36] Implementation research and assessment should be embedded within new primary health-care services and approaches, so that locally produced evidence can support effective national scale-up.[21,37] Health policy and decision makers need to commission implementation research, and apply innovative and empirically supported approaches.[23] Policy makers also need to know the extent to which interventions are based on evidence. Research findings need to be disseminated widely and beyond the research community, in ways that non-academic people can understand.

See **Online** for webappendix

Research priorities for primary health care

The so-called 10/90 gap indicates the imbalance of having a small proportion (10%) of research funding addressing the health needs of most of the population (90%) worldwide.[38] Identification of research priorities for primary health care is important for optimising the effective use of scarce resources. Reviews have established the scarcity of rigorous evidence for implementation and delivery of services generally and for human resources particularly, especially in low-income and middle-income countries.[39]

The child health and nutrition research initiative (CHNRI) has developed a systematic method for setting priorities for health research investments that can be applied globally and nationally and for different purposes.[40] We used this method, which has previously been used in several areas,[41] to identify research priorities for primary health care, with the following criteria: the likelihood that the research option would (1) be answerable, (2) be feasible to undertake, (3) fill a crucial

For the **drugs for neglected diseases initiative** see http://www.dndi.org/

Panel 2: Actions to increase commitment and resources for primary health care

- Join with other calls for global commitment to allocate more development assistance to health for the countries with the least favourable health indicators and most difficult health challenges, investing in comprehensive and selective primary health care to build strong health systems over time
- Mobilise strategic, consistent, and long-term investment from Ministries of Finance, linking with Ministries of Health in primary health care within health-sector planning with evidence of the cost-effectiveness and economic and development benefits of primary health care
- Develop a comprehensive human resource plan for primary health care that is tailored to every country, linking with existing national planning and targeting high-impact interventions for maternal, newborn, and child health, adult infections, and chronic diseases, especially in areas that are difficult to serve, delegating tasks when appropriate and strengthening team work, supervision, and coordination, and addressing staff retention issue for hard-to-serve settings
- Rationalise the use of drugs, because of their large budget requirements, with generic drugs and public funding for essential drugs, and promote innovation for development of essential dugs and appropriate technology that is needed for crucial primary health-care services
- Increase local capacity for collecting and using data for action to improve the coverage, quality, and equity of primary health-care services
- Promote community and civil society participation in the primary health-care process towards health and development for all

gap in knowledge, and that the resulting intervention would (4) improve deliverability of interventions in primary health care, (5) improve equity, and (6) have an important effect on disease burden.

The rationale, conceptual framework, and application guidelines have all been described in greater detail elsewhere[40,41] and in the webappendix.

Panel 1 shows the top five research options addressing overall primary health-care questions with the highest scores, along with the top questions for delivery of services for maternal, newborn, and child health. Research priorities for chronic diseases have been defined in a previous paper in this issue.[8] In each of the categories, a list of important research issues was identified by the *Lancet* Alma-Ata Working Group. In commissioning research to address these issues, local stakeholders and researchers (both clinical and health-service researchers) should be involved in further refining the research questions to develop effectiveness studies that are locally relevant. One opportunity is when the Global Ministerial Forum on Research for Health, in Bamako, Mali, November 2008, brings together policy makers and researchers to promote and support research on priorities identified to improve health in developing countries. As with clinical services, delivery of high-quality research, especially with an equity focus, first needs development and nurturing of local capacity.[42]

For information on the **Global Ministerial Forum on Research for Health** see http://www.bamako2008.org/

Renewing commitment and investment in primary health care

We call for the global health community, governments, national authorities, international agencies, and civil society to revitalise primary health care according to the original tenets of Alma-Ata and to monitor progress. We propose the establishment of a process to set new measurable targets that build on, yet go beyond, the MDGs to reflect the broader primary health-care agenda and to ensure continued momentum towards health for all after 2015. A possibility for one such goal could be a specified increase in average life expectancy in all countries, with defined targets for equity and quality of life.

We propose several actions to increase commitment and resources for primary health care (panel 2). The biggest challenge is implementation with community participation, especially scaling up known, cost-effective interventions for prevention and essential care. Priorities continue to be maternal, newborn, and child health; family planning; and the high burden of communicable diseases in many countries. However, there is also a growing need to address chronic, non-communicable diseases. Reaching high coverage for underserved people in rural and urban communities is essential and is the real test of social justice and sex equity. Resources should be increased and targeted towards evidence-based and integrated packages of care and towards the least served countries and communities. These resources can be delivered through strengthened primary and community care, together with community mobilisation and intersectoral collaboration for health. Individuals must be seen as active participants in their health, not passive recipients of supply-driven interventions. The emphasis has to shift from showing immediate results from single interventions to creating integrated, long-term, sustainable health systems, which can be built from a more selective primary health-care start. Research needs to be embedded within primary health-care activities, especially to be able to compare varying delivery approaches.

Margaret Chan, Director-General of WHO, has recently said "When I took office at the start of last year, I called for a return to primary health care as an approach to strengthening health systems. My commitment has deepened. If we want to reach the health-related Goals, we must return to the values, principles, and approaches of primary health care."[43] What is needed is for all stakeholders to renew their commitment to the principles of primary health care so that we do, after all, achieve health for all.

Contributors

JW, JEL, AT, and AdeF prepared the initial draft of the report, which was edited by all the named authors. MC, IR, and REB undertook the research priorities analysis. The other members of the *Lancet* Alma-Ata Working Group (listed below) participated in the research prioritisation analysis and commented on drafts of the report. All authors have seen and approved the final version.

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Conflict of interest statement
We declare that we have no conflict of interest.

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Stranded in San Francisco

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In August, 2005, a 51-year-old unemployed, divorced man was brought by ambulance to our emergency department, after being found unconscious in the hallway of the hotel where he lived alone. On arrival at hospital, he had regained consciousness. He reported that small purple patches, which were not painful or itchy, had appeared on his left buttock a month before; the patches had grown, and coalesced into a large "bruise" that extended down his leg. The patient also reported severe light-headedness, and daily episodes of fainting on exertion. The patient had not received medical care for several years. He reported no previous illness, and was taking no medications. He denied using illicit drugs or consuming alcohol.

We observed scleral icterus, gingivitis, a small, oozing laceration above the upper incisors, and a widespread, ecchymotic, purpuric rash (figure). The patient had severe orthostatic hypotension, and tangential speech. Faecal-occult-blood testing was positive. Blood tests showed normocytic anaemia, a packed cell volume of 24%, an unconjugated bilirubin concentration of 94 µmol/L, and a creatinine concentration of 150 µmol/L due to dehydration. The clotting screen showed nothing of note. Urinalysis was strongly positive for haemoglobin and ketones, weakly positive for bilirubin, and showed 0–2 red blood cells per high-powered field. On further questioning, the patient stated that, for months, he had eaten only canned tuna and crackers. The serum concentration of ascorbic acid was undetectable, and histopathological analysis of a skin biopsy sample showed perifollicular haemorrhage, confirming the diagnosis of scurvy;[1] we deduced that the high bilirubin concentration was caused by haemolysis possibly occurring within bruises and intravascularly . We prescribed ascorbic acid (200 mg, four times a day); the patient's rash and light-headedness resolved within 2 weeks. In a psychiatric interview, the patient explained that gangsters had put amphetamines in his food, and might kill him for eating anything other than tuna and crackers. The psychiatrist concluded that these beliefs were delusional, and also noted thought disorder, flattened affect, and social withdrawal. He diagnosed schizophrenia, and prescribed ziprasidone. A social worker contacted the patient's family, whom he had not seen for years; the patient was discharged to supported accommodation. He continued to have persecutory thoughts about food, but ate what his family and carers gave him. He became depressed, sleepless, and thought of jumping off a pier. Ziprasidone was replaced with risperidone, then quetiapine. The patient was also treated with citalopram. He was given regular group and individual psychotherapy. His psychosis and depression resolved. When last seen by us, in June, 2007, he was able to care for himself, although he received support from a social worker in managing his finances. He ate well—and, indeed, became overweight, consistent with his drug regimen.[2]

Figure: **The gangsters' dirty work**

Our patient was the third and youngest child of low-income Irish immigrants, with a family history of depression. He was a popular athlete in high school. As a young adult, he had occasionally used LSD and marijuana. After dropping out of college, he worked as a laboratory technician and in local government, got married, and had two daughters. At 25 years of age, he was having difficulties at work when he was arrested after a brawl at a policeman's stag party. His trial was stressful, partly because of a public backlash against the police. He lost all his money, his wife left him, and he became homeless in his thirties. He gradually lost contact with his family. In the USA, most people receive health insurance through their employer. Hence, people who lose their jobs can lose access to health care until they have become seriously unwell. People with mental illness are especially likely to lose their social network, and have difficulty accessing health care.[3] Even among people who apparently have a high genetic risk of schizophrenia, it seems that circumstances create mental illness;[4] social support and relationships can be crucial to preventing it, or facilitating recovery.

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Email: conferences@esf.org | www.esf.org/conferences

(260620)

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Training Programs in
Public Health Interventions NETwork

Conference Announcement and Call for Late Breakers

2008 European Scientific Conference on Applied Infectious Diseases Epidemiology

Berlin, 19 - 21 November 2008

We welcome you to register and participate at this conference.

Over the three-day conference, a wide range of topics related to applied infectious disease epidemiology will be covered and there will be four plenary sesssions:

- Migration and communicable diseases in Europe
- Special needs in communication. How to reach the hard-to-reach?
- The expansion of vector-borne infections in Europe: are we prepared for it?
- Old and new vaccines, old and new challenges.

The Conference will be of interest to epidemiologists, microbiologists, clinicians, public health experts, and veterinary and environmental health experts with a professional and scientific interest in applied infectious disease epidemiology.

We invite you to submit abstracts for an oral presentation in the Late Breaker Session, which will take place on Friday November 21st. Eligibility criteria for abstract submission in the Late Breaker Session are available on www.escaide.eu.

Final deadline for submission of abstracts for Late Breaker Session is September 29th.

Information
Further information is available at: **http://www.escaide.eu**
For questions regarding the Scientific Conference Programme contact: **escaide.conference@ecdc.europa.eu**
For logistical questions contact the Conference Secretariat:
CECOFORMA SA - Rue Léon Frédéricq, 14 - 4020 Liège, Belgium
Tel.: +32 4 340 47 95 - Fax: +32 4 344 28 08 - E-mail: escaide@cecoforma.com

(258811)

CONSULTANCY SERVICES

INTERNATIONAL CONGRESS ON
PEER REVIEW AND BIOMEDICAL PUBLICATION 6

SEPTEMBER 10-12, 2009
VANCOUVER, BC, CANADA

CONGRESS ADVISORY BOARD

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PEER REVIEW CONGRESS CALL FOR ABSTRACTS

Topics of interest

- Mechanisms of peer review and editorial decision making used by journals and funders
- Evaluations of the quality, validity, and practicality of peer review and editorial decision making
- Biases, breakdowns, and other weaknesses
- Quality assurance for reviewers and editors
- Authorship, contributorship, and responsibility for published material
- Conflicts of interest
- Research misconduct
- Peer review of grant proposals
- Ethical concerns for researchers, authors, editors, and reviewers
- Editorial freedom and integrity
- Editorial policies and responsibilities
- Effects of funding and sponsorship on scientific publication
- Financial models for peer review and scientific publication
- Online and Web-based peer review and publication
- Open access and archiving
- Prepublication posting and release of information
- Evaluations of the quality of scientific information
- Quality and reliability of data presentation and scientific images
- Quality of new media in scientific publication (video, audio, blogs, etc)
- Effectiveness of standards designed to improve the quality of scientific publication
- Improved tools and metrics to assess and measure the quality of peer-reviewed published content
- Peer review, use, and quality of scientific conference proceedings and gray literature
- Changes in readership and use of peer-reviewed published content
- Methods for improving the quality, efficiency, and equitable distribution of biomedical information
- New technologies that affect the quality, integrity, dissemination, and access of biomedical information
- The future of scientific publication

For more information

Annette Flanagin
JAMA
tel: 312-464-2432
jama-peer@jama-archives.org

JAMA & ARCHIVES JOURNALS

BMJ Group

Details available at www.jama-peer.org

(258456)

Abstracts Due March 1, 2009

COURSES

(260320R)

10 TENTH ADVANCED VACCINOLOGY COURSE

Les Pensières • Veyrier-du-Lac (French Alps)
18-29 May 2009
Application deadline : 15 november 2008

Organized by Fondation Merieux and University of Geneva
With the co-sponsorship of European Commission, Bill and Melinda Gates Foundation, WHO, NIH-NIAID and [illegible], Johns Hopkins Bloomberg, ESPID, NFID, NVPO, Vaccine Industry

Scientific Direction
Paul-Henri Lambert, MD, Geneva, Director of the course
Stanley Plotkin, MD, Philadelphia, Senior Advisor

Objective of the course
To facilitate critical decision-making in vaccinology
Top-level lectures, practical exercises - English language

Who should apply?
Scientists and decision-makers from the public and private sector

Programme Fees
1. Standard registration fee, incl. full attendance in the course (2 weeks) and course material: EUR 3 500, VAT incl. - Reduced registration fee for academic & governmental sector, NGOs: EUR 1400, VAT incl.

2. Accommodation fee (lodging and meals): EUR 2050, VAT incl.

Fellowships (travel, accomodation and registration costs) will be available for participants from Developing Countries and for a few scientists from EU countries.
Also offered to selected ESPID members. NFID provides fellowships to young american vaccinologists.

Information and application forms :
www.advac.org
OR
www.fondation-merieux.org
Contact : advac@medecine.unige.ch
katia.mielczarek@fondation-merieux.org

COURSES

DEAN OF THE SCHOOL

The Fiji School of Medicine offers programmes in Medicine, Dentistry, Pharmacy, Physiotherapy, Radiography, Medical Laboratory Science, Environmental Health, Public Health, Nutrition & Dietetics. Currently there are over 1000 students enrolled in FSMed from 16 countries and territories of the Pacific and beyond.

The Council of the Fiji School of Medicine invites applications from qualified, highly motivated and dynamic professionals to fill the position of DEAN. The Dean of FSMed is the head and chief executive officer of the institution. The Dean will lead and manage the School in achieving its goals and objectives in a manner consistent with the needs and policies of its Council and in accordance with statutory/regulatory requirements.

Essential Qualifications and Requirements:

- Medical or other health professional qualification eligible for registration in Fiji.
- Post-graduate tertiary qualifications in one or more of the following disciplines:
  - Medicine,
  - Health,
  - Education,
  - Management,
  - Accounting & Finance,
  - Human Resources Management.
- Demonstrated success at a senior management level in a large organization.
- Successful managerial experience relevant to medical education.
- Successful financial management responsibility at a senior level.

Salary and Other Conditions:

An attractive salary will be offered and will be determined based on the qualifications and experience of the successful applicant.

The successful applicant will initially be offered a three (3) year contract with possibility of a further three years based on satisfactory performance. The performance of the Dean will be subject to annual appraisal by a committee of the Council.

Applications close on 3rd October, 2008

For enquiries, please contact:

i) Professor Robert Moulds, Phone: -3233 201; Email: r.moulds@fsm.ac.fj
ii) Ashish Chand, The Human Resources Manager, Phone: -3233801; Email: a.chand@fsm.ac.fj

(260319)

THE LANCET
Please mention *The Lancet* when replying to advertisements

Imperial College London

National Heart and Lung Institute
in collaboration with

Royal Brompton & Harefield NHS
NHS Trust

New Drugs and Targets for Asthma and COPD

19th - 21st November 2008

Course Organisers: Professor Peter Barnes and Dr Trevor Hansel

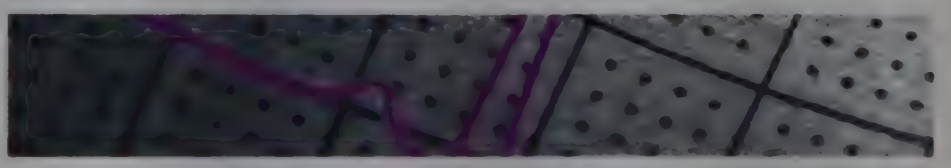
This course is focussed on the identification of novel targets and development of new approaches and therapies for asthma, allergy and COPD. These conditions cause a large and increasing global burden of disease. Presentations by clinical academics and senior members of the pharmaceutical industry cover the latest breakthroughs in research and clinical development of new drugs in this rapidly changing area. The course will be of particular relevance to those in the pharmaceutical industry, researchers in the field of respiratory medicine and specialised clinicians and health care professionals.

Course fee: £650 (£250 daily rate)
SpRs: £300

For further information and registration please contact:
Karina Dixon, Events Office, NHLI, Imperial College London,
Dovehouse Street, London SW3 6LY UK.
E-mail: academicevents.nhli@imperial.ac.uk

Tel: +44 (0)20 7351 8172 Fax: + 44 (0)20 7351 8246
http://www1.imperial.ac.uk/medicine/about/divisions/nhli/nhli_events/

(256260R)



DERMATOLOGY

NORFOLK AND NORWICH UNIVERSITY HOSPITALS NHS FOUNDATION TRUST

CONSULTANT IN DERMATOLOGY

Applications are invited for a Consultant in Dermatology which is a new substantive post which has arisen as a consequence of service developments within the Trust. The Dermatology Directorate has five consultants, Dr Jennifer Garioch, Dr Clive Grattan, Dr Nick Levell, Dr Eunice Tan and Dr George Millington and an Associate Specialist Dr Nasir Shah. The department sees 8,000 news and 12,000 follow ups per year. Facilities include a dedicated outpatient unit with surgical suites, phototherapy, a day treatment unit and five dermatology in-patient beds. Special interests of the department include skin cancer and skin surgery, cutaneous allergy and urticaria, contact dermatitis, paediatric dermatology.
A specialist interest is desirable but not essential.
The Norfolk and Norwich University Hospital is an acute teaching Trust providing comprehensive general and specialist services for a population of up to 750,000 on two sites; the 987-bed hospital is adjacent to the University of East Anglia with a Medical School. The curriculum there is innovative and integrated
Located on the periphery of the fine cathedral city of Norwich, we are surrounded by unspoilt and attractive East Anglian countryside, including the Norfolk Broads.
For informal enquiries please contact Dr Jennifer Garioch, Clinical Director on 01603 288210 or email jennifer.garioch@nnuh.nhs.uk
To learn more about the Trust, please see our web site at www.nnuh.nhs.uk
Primary consideration will be given to suitably qualified doctors who do not require a work permit to work in the UK.
An application form and job description are available from the Human Resources Department, Norfolk and Norwich University Hospital, Colney Lane, Norwich, NR4 7UY, telephone 01603 286205, or by email from Lesley.waller@nnuh.nhs.uk to whom the application form together with TEN copies of your curriculum vitae with the names and addresses of three referees should be received by 26 September 2008. (260327R)

FELLOWSHIPS

(259364R)

DIABETES RESEARCH & WELLNESS FOUNDATION

CLINICAL RESEARCH FELLOWSHIP 2009

DRWF Research Fellowships are given for research related to causes, cures or complications of diabetes

Applications are invited from: medically qualified doctors (MBChB or equivalent) working towards a higher degree, ie MD or PhD

DRWF Clinical Research Fellowships cover a period of up to 3 years, in a recognised institution or department within the United Kingdom

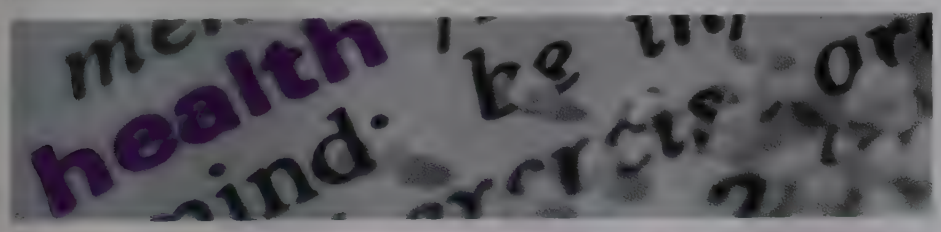
Support for the 2009 Fellowship is a maximum of £60 000 per year, to include a salary, consumables and some support costs

Interested applicants are asked to send a pre-application (electronically and by post) maximum of 2 sides A4 as a word document (please see DRWF website for parameters). Plus a brief curriculum vitae on a separate single sheet of A4.

E-mail: sarah.brown@drwf.org.uk

By (deadline) 5pm, 12th November 2008

Telephone 023 9263 6135 www.drwf.org.uk



IMMUNOLOGY

(258388R)

UNIVERSITÄTS FREIBURG KLINIKUM

The Center for Chronic Immunodeficiency (CCI) at the University Medical Center Freiburg is recruiting an

Immunopathologist (CCI position 15).

The candidate should have a M.D. or M.D. / Ph.D. degree and be board certified in Clinical Pathology. The responsibilities of the position include the implementation of an innovative immunological and molecular diagnostic approach to specimen obtained from patients with immunodeficiency. Applicants must show a strong research interest in areas relevant for understanding human immunodeficiency and the development of an independent research program is expected. The applicants should have experience in diagnostic immunopathology including peripheral blood, bone marrow, and lymph node pathology, multiparameter flow cytometry, immunohistochemistry and molecular diagnostics. The candidate will work at the Institute of Pathology under supervision of Prof. Dr. med. Martin Werner. The initial appointment will from 1.1.2009 for the first funding period of the CCI (until October 2013). The "Center for Chronic Immunodeficiency" (CCI) is an Integrated Research and Treatment Center at the Freiburg University Medical Centre. This BMBF funded institution hosts clinicians and basic scientists and closely interacts with the Departments of Medicine and Pediatrics, the SFB620, the Max-Planck-Institute for Immunobiology and the Excellence Cluster "bioss". The CCI offers excellent conditions for advanced education and career development, by providing a mentoring system in an interdisciplinary environment for basic as well as clinical research. Applications should include a full CV, a statement of research interests and the names and addresses of two references, and should be sent by email to the speaker of the CCI Prof. Dr. S. Ehl (stephan.ehl@uniklinik-freiburg.de). Please state the CCI Position (15) on your application.Further information on the CCI and the Institute of pathology can be obtained at www.cci.uniklinik-freiburg.de and www.uniklinik-freiburg.de/pathologie

ONCOLOGY

Fellowship in Medical Oncology

Paterson Institute for Cancer Research

Reference number: PI/08/22
Salary will be in the range of £30,231 - £45,562 based on qualifications and prior experience

These posts are available from 1 October 2008 for three years and are expected to lead to the award of PhD.

The successful implementation of novel mechanism-based anticancer drugs increasingly requires early development of robust biomarkers to indicate drug efficacy and ideally, to predict drug response. Cancer Research UK and AstraZeneca Pharmaceuticals have together provided an outstanding opportunity for a Medical Oncology Research Fellow in Biomarker Qualification.

You will spend time within (i) the University of Manchester, Department of Medical Oncology Derek Crowther (DCU) Phase I Trials Unit of Christie Hospital and the Clinical & Experimental Pharmacology (CEP) Laboratory at the Paterson Institute and (ii) at the AstraZeneca, Alderley Park site in Cheshire, UK in order to learn about early clinical trials in cancer treatment from the academic and industrial perspectives. Both sites have state-of-the-art facilities for the development of novel therapeutic agents in the treatment of cancer.

You will hold Membership of the Royal College of Physicians (MRCP) or equivalent and be close to completing your clinical training. Clinical supervision will be provided at the Christie Hospital by DCU Director Professor Malcolm Ranson and translational research will take place in the juxtaposed CEP laboratories under the guidance of Professor Caroline Dive and clinical colleagues within the Manchester Cancer Research Centre. At AstraZeneca, you will be project managed by Professor Andrew Hughes, Director of Discovery Medicine. You will undertake specific research projects relating to predictive and pharmacodynamic circulating biomarkers. You'll also undertake one clinic per week. The projects are intended to lead to peer-reviewed publications and the award of a PhD.

Interested applicants should contact either Professor Malcolm Ranson on 0161 446 3743 or email: malcolm.ranson@christie.nhs.uk Professor Caroline Dive on 0161 446 3036 or email: cdive@picr.man.ac.uk or Professor Andrew Hughes on 01625 512 092 or email: andrew.hughes@astrazeneca.com for informal discussions.

Applicants should send a full CV marked Fellowship in Medical Oncology (Ref Number: PI/08/22) to Laura Humes, HR Adviser by email: lhumes@picr.man.ac.uk

The deadline for receipt of CV's is 28 September 2008

www.paterson.man.ac.uk

(260335R)

MANCHESTER 1824 The University of Manchester

CANCER RESEARCH UK

THE LANCET

Please mention *The Lancet* when replying to advertisements

MEDICAL OFFICER

Department of Health & Children
AN ROINN SLÁINTE AGUS LEANAÍ

Dublin, Ireland

CHIEF MEDICAL OFFICER

The Department of Health and Children wishes to recruit a Chief Medical Officer (CMO). The position of CMO is a pivotal and influential one which has a leading role in shaping national health policy and services. The person appointed will report to the Secretary General of the Department and be a member of the Department's Management Advisory Committee.

Key responsibilities of the post of Chief Medical Officer include:

- providing expert medical evidence, analysis and advice to the Minister, Ministers of State and to the Department, especially in public health matters;
- leading and managing the Department's team of Medical Officers;
- leading on patient safety issues, emergency planning and other assigned areas of work;
- communicating Departmental positions in the media and at national and international fora;
- developing good working relationships with the medical profession and relevant external agencies and stakeholders, both nationally and internationally.

The successful candidate must have the knowledge, expertise and authority to provide evidence based medical advice across a broad range of areas and must also have a strong results focus and significant leadership experience.

Essential Requirements, Qualifications and Experience include:

Candidates must, on or before, 1 October, 2008

- be a medical practitioner who is registered (otherwise than provisionally or temporarily) in the General Register of Medical Practitioners or who is entitled to be so registered;
- hold a specialist medical qualification from a recognised Irish post graduate training body or the equivalent of such a qualification;
- be registered, or be entitled to be registered, on the Register of Medical Specialists of the Irish Medical Council;
- have had, since becoming entitled to full registration, at least ten years' satisfactory experience in the practice of the medical profession;
- possess a high standard of professional attainment.

The appointment is to an established position on a probationary contract in the Civil Service.

Salary: €186,891 with effect from 1 September 2008 (for persons making a personal pension contribution). A non pensionable performance related awards scheme is in operation.

Closing Date: Thursday 25 September, 2008.

For further details on this significant opportunity and to make an application, please log onto our website ***www.publicjobs.ie*** or for a confidential discussion contact Tommy Quinn on 00-353-1 8587405 or at ***tommy.quinn@publicjobs.ie***.

publicjobs.ie
An tSeirbhís um Cheapacháin Phoiblí
Public Appointments Service

We are committed to a policy of equal opportunity and encourage applications under all nine grounds of the Employment Equality Act. Cuirfear fáilte roimh chomhfhreagras i nGaeilge.

(260560)

MICROBIOLOGY

THE ROYAL SURREY COUNTY HOSPITAL NHS TRUST
2 CONSULTANT MICROBIOLOGISTS

One of the two vacancies is a replacement post for a Consultant Medical Microbiologist with a special interest in infection control. The second vacancy is a new post for a Consultant Medical Microbiologist with a special interest in infection management and antibiotic stewardship. The posts can be rotated between the two post holders after a period of three years. Both posts are based at the Royal Surrey County Hospital with on call and rotational cover shared with the four consultant microbiologists and two consultant virologists in Frimley Park Hospital.

Partnership Pathology Services (PPS) is a joint venture between Royal Surrey County Hospital and Frimley Park Hospital NHS Trusts with the microbiology laboratory being based at Frimley Park Hospital. It was a Carter pilot site and provides supra regional services for trace metals, peptide hormone, cardiovascular testing and is a Regional Training School for cytology. It is a regional centre for national bowel screening and an MHRA laboratory evaluation unit and the Directorate has a number of joint appointments with the University of Surrey.

The Royal Surrey County Hospital is in the process of becoming a foundation trust. The hospital provides a comprehensive local service to patients in West Surrey Health Authority and a wide range of services to patients in six other Health Authorities and for over 50 GPs in the South Eastern Region. Maxillofacial surgery, pancreas surgery and diabetology attract national referrals; The Trust is a Calman Hine Cancer Centre for a population of 1·2 million. The St Luke's Cancer Centre is situated at this hospital and a regional service is provided by radiotherapy to the Southern Home Counties.

The Trust is in an excellent location close to Central London and has good train and motorway connections to London. As well as all the advantages of being close to the city, you will discover that Surrey has a beautiful countryside as well as excellent schools, transport links, amenities and residential areas. The Trust has on-site nursery facilities.

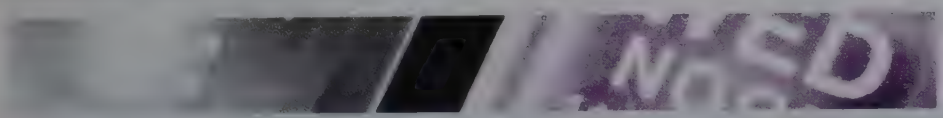
The successful candidates will hold the new consultant contract with 10 Programmed Activities and the job plan will be reviewed after six months. The post attracts an 8% on-call availability supplement.

The postholder must be a registered medical practitioner and on the Specialist register of the GMC or be eligible on the specialist register within three months of the date of the Advisory Appointment Committee.

For an informal discussion please contact: Dr Andrea Guyot (Specialty Lead) on 01483 571122 X4480 or Dr Ian Fry (Clinical Director) 01276 604604 x4593.

To apply for this post please contact the Medical Human Resources Department, The Royal Surrey County Hospital, Egerton Road, Guildford, GU2 7XX. Telephone 01483 406726 and an application form and job description will be sent or emailed to you.

Closing date: 3 October 2008. (260617)



NEUROLOGY

UNIVERSITY OF LIVERPOOL

School of Clinical Sciences

Academic Clinical Lecturer in Neurology

£30,231 - £52,346 pa

Liverpool has the UK's only Neuroscience NHS Trust (The Walton Centre for Neurology and Neurosurgery), and the University of Liverpool is a partner in Liverpool's NIHR Biomedical Research Centre in Microbial Diseases.

This new "Walport" Clinical Lecturer position is for a neurology trainee/research fellow who wishes to study neurological infections. You should have completed (or be well advanced with) an MD/PhD in any neuroscience area (clinical trials/epidemiology, neuroinflammation, neurodegeneration or neuroinfection), and wish to develop your own research interest within the Brain Infections Group's basic, translational or clinical UK and International themes (www.liv.ac.uk/braininfections). The post is available for 4 years initially.

Job Ref: A-568277/L **Closing Date: 13 October 2008**

For full details, or to request an application pack, visit www.liv.ac.uk/working/job_vacancies/ or e-mail jobs@liv.ac.uk
Tel 0151 794 2210 (24 hr answerphone)
Please quote Job Ref in all enquiries.
COMMITTED TO DIVERSITY AND EQUALITY OF OPPORTUNITY

(260622)

www.show.scot.nhs.uk/nhsfv

NHS Forth Valley
1948-2008 60 years of the NHS

Acute Services

Consultant Microbiologist

Applicants are invited for the above post. This vacancy is for one of two Consultant Microbiologists who are supported by an Associate Specialist. The appointment is full-time (10 Programmed Activities), and will be subject to the terms and conditions of service of the Consultant Grade (Scotland).

Duties will be based at both Falkirk and District Royal Infirmary and Stirling Royal Infirmary.

NHS Forth Valley provides acute services for a population of 280,000 people in Central Scotland. Acute services are currently provided on two sites in Stirling Royal Infirmary and Falkirk & District Royal Infirmary. The building of a single replacement acute hospital at Larbert is well underway and the new hospital will open in a phased manner in 2010/11. In the meantime, all acute inpatient, emergency and complex services have been centralised on the Stirling Royal Infirmary site.

Applicants must possess or be within six months of their CCT date at the time of interview. They must also hold the Membership of the Royal College of Pathologists or a qualification of an equivalent standing.

Applicants are encouraged to visit the Department and meet senior staff. Informal enquiries should be directed to Dr Roderick Neilson, Lead Clinician for Laboratories, by telephone on 01324 624000 extension 5408

This post represents a full-time commitment, however applicants who are unable to undertake a full-time commitment are also welcome to apply.

Job descriptions are available from Clare Bathgate, Career Grade Co-ordinator, Career Grade Medical Workforce, Hut 7, Falkirk & District Royal Infirmary, Major's Loan, Falkirk FK1 5QE, or by telephone on 01324 616036 or e-mail at clare.bathgate@nhs.net

Applications for the post should be submitted in the form of a comprehensive curriculum vitae (8 copies) including names and addresses of three referees (including your current or most recent employer), details of GMC registration and CCT (or evidence of eligibility to apply for CCT) should be submitted to the above address by 11th October 2008.

Please quote reference number: 0908699

NHS Forth Valley is committed to equal opportunities and applications are welcome from anyone who meets the relevant criteria.

(260624)

RECRUITMENT

C O P E COMMITTEE ON PUBLICATION ETHICS

Registered Charity No 1123023
Registered in England and Wales Company No 6389120

RAISING THE QUALITY OF ACADEMIC JOURNALS

The Committee on Publication Ethics (COPE) is a charity that works to promote ethical conduct in scientific research and its publication in science journals. It was founded in 1997 by a group of medical journal editors concerned about research and publication misconduct. It now has over 3500 members, including many major medical and scientific journals. Its main activity is to advise the editors of academic journals on how to handle cases of suspected research and publication misconduct.

COPE is looking for new members to join its Council, which is responsible for the charity's policy and management. They will be expected to attend four meetings a year (in London) as well as take part in sub-committees and other COPE-related tasks. There are also occasional strategy meetings and an annual seminar to attend. Council members may also be asked to take responsibilities as trustees of the charity. This is a voluntary position. The initial term of office is three years, but members may be reappointed for a further term of three years. Applications from journal editors are particularly welcome

Further details can be found on the website: www.publicationethics.org.uk

Those who are interested should send a short CV (**no more than 4 pages**) plus a covering letter stating what they can contribute to COPE Council. Please email to the COPE Administrator, Linda Gough (cope_administrator@publicationethics.org) or by post to Linda Gough, PO Box 39, Harleston, IP20 9WR, UK.

The closing date for applications is **30 September 2008**.

Registered office: COPE, Hempsons House, 40 Villiers St, London WC2N 6NJ, United Kingdom

(260619)

October 2008

24–26
32nd Annual Psychopharmacology course
Westin Copley Place, Boston MA

This course offers a strong foundation in best practices, includes cutting-edge new content, and is presented by renowned faculty from Massachusetts General Hospital and Harvard Medical School. It provides a comprehensive review of contemporary psychopharmacology, with emphasis on practical translation of advances in psychopharmacology to everyday patient care: controversies in psychopharmacology; managing side effects and residual symptoms; using CBT to enhance treatment adherence; interactive case conferences on treatment-resistant depression and anxiety; and more.

Course Directors: Jerrold F. Rosenbaum, MD, and Maurizio Fava, MD,

Contact: http://www.mghcme.org/adult or call (866) 644-7792.

(260098)

November 2008

5
Food Allergy: Science and Clinical Practice
76 Portland Place, London W1, UK

Contact: Allergy Research Foundation
PO Box 18, Aylesbury HP22 4XJ, UK
Tel/Fax +44 (0)1296- 655818
philip_goddard@tiscali.co.uk

(257268)

6–7
AICR Annual Research Conference
Washington, DC, USA

The American Institute for Cancer Research (AICR) Annual Research Conference on Food, Nutrition, Physical Activity and Cancer takes place November 6 and 7, 2008 in Washington, DC. Topics include cancer and vitamin D, dietary supplements, epigenetics, behavioral change, probiotics, and personalized nutritional genomics, as well as novel approaches to cancer survivors.

For information and registration, visit www.aicr.org/conference, call 202.328.7744 or email research@aicr.org.

(259406)

9–13
9th International Congress on Drug Therapy in HIV Infection
Scottish Exhibition and Conference Centre, Glasgow, UK

Now firmly established as one of the major HIV meetings, the Congress will address further developments and innovations in therapeutic strategies and research impacting on the management of HIV infection. The meeting aims to provide a topical scientific programme that will incorporate keynote lectures, plenary presentations, free papers, satellite symposia and poster sessions. The formal programme will be supplemented by a full scientific exhibition.

Contact: Congress secretariat on hiv9@kp360group.com
For further information please visit www.hiv9.com

(249050R)

November 2008

14–16
Lancet Asia Medical Forum: Stroke in Asia
Beijing, China

Contact: http://thelancetforum.com

December 2008

2–4
3rd UK Stroke Forum Conference
Harrogate International Centre, UK

The UK Stroke Forum is a coalition of over 20 organisations committed to promoting multidisciplinary stroke research and education.

The scientific conference, hosted by The Stroke Association, is aimed at all health-care professionals working in stroke care, education and research. Free training sessions organised by BASP, NSNF and the Rehab MDT are available for all pre-registered delegates

Call for abstracts—abstracts are welcomed on all aspects of stroke research including ongoing trials (deadline for submission 27 August 2008)

Contact:
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Editorial Consultants at *The Lancet*

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In April, 2005, *The Lancet*'s editors announced the creation of a new role at the journal—Editorial Consultant. Where did these consultants come from? Most of those appointed had applied to an advertisement we had placed in the journal. Some were invited, because of their previous associations with the journal. We welcome further applications from low-income or middle-income countries, especially from those not represented.

What is an Editorial Consultant? This role has many parts. Editorial Consultants will act as peer reviewers of papers sent to *The Lancet*, and suggest the names of other such reviewers. They will also suggest topics we should cover, or even write themselves. They will act as ambassadors for the journal, telling colleagues about what we do and particularly about our fast-track and protocol-review services.

We have aimed for an international panel of consultants. Perhaps unsurprisingly, most applicants came from Europe or North America. We hope to broaden our range.

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